

THE IRON AGE

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Web of Conveyors Serves Factory

Unusual Combination of Straight Runs, Curves, Spirals
and Heavy Grades—Upper and Lower
Runs of Belt Both Utilized

BY BURNHAM FINNEY*

ONE of the foremost factors in reducing costs in plants operating on a basis of mass production is an efficient system for handling materials. The kind of equipment best suited to this purpose is apt to vary according to the specific requirements of each company. In many cases a combination of standard conveying machinery and specially designed apparatus, adapted to local conditions, secures the best results.

At the new plant of the Kelvinator Corporation, Detroit, manufacturer of Kelvinator electric refrigerating units and of Nizer ice cream cabinets, provision has been made in practically every department for transporting materials mechanically. In fact, the plant resembles a large web woven of various transportation lines. Although this system has been in operation only a short time, it has already effected substantial economies.

It is no exaggeration to say that materials are carried through the entire plant without hand labor, from the time they reach the receiving department until finished refrigerating units are shipped to customers. Conveyors even extend the length of the stockrooms, so that materials, moving from this central point to any department in the plant, are transported by mechanical methods.

Units of Several Types Employed

WHILE roller and motor-driven belt conveyors predominate, materials are not handled exclusively in that manner. An overhead monorail system and electric lift trucks are utilized for certain types of work. Whenever materials must be sent from one floor to another, they are taken on spiral gravity conveyors, on "booster" inclined motor-driven conveyors or on automatic pendant-type vertical elevators.

The manufacture of electric refrigerating units lends

UNUSUAL flexibility features the conveyor system in the Kelvinator plant. Tote boxes, sent up or down the system as need be, are emptied of their products at proper points and placed back in the system, so that they do not pile up anywhere. Trays for special materials are designed to fit the boxes. Thus the loading and unloading, as the boxes pass a given point, are simple matters. At certain points electric lift-trucks and other equipment are used, but mainly the manufacturing process relies upon the conveyors, which are booster or belt or roller gravity, as immediate circumstances require.

itself well to straight-line production. Arrangement of operations is much like that in automobile factories, with sub-assembly lines feeding main assembly lines, which in turn supply a final assembly line. In practically all departments in which there is a sub-assembly or final assembly of parts, the work is done along motor-driven belt conveyors the movement of which is timed to conform to the necessity of the various operations. In the compressor assembly department, for example, the action of the belt conveyor is regulated so that the crankshaft, valves and pistons can be fitted to the cylinder block by workmen stationed at points along the conveyor. The same is true of the thermostat assembly department and of the

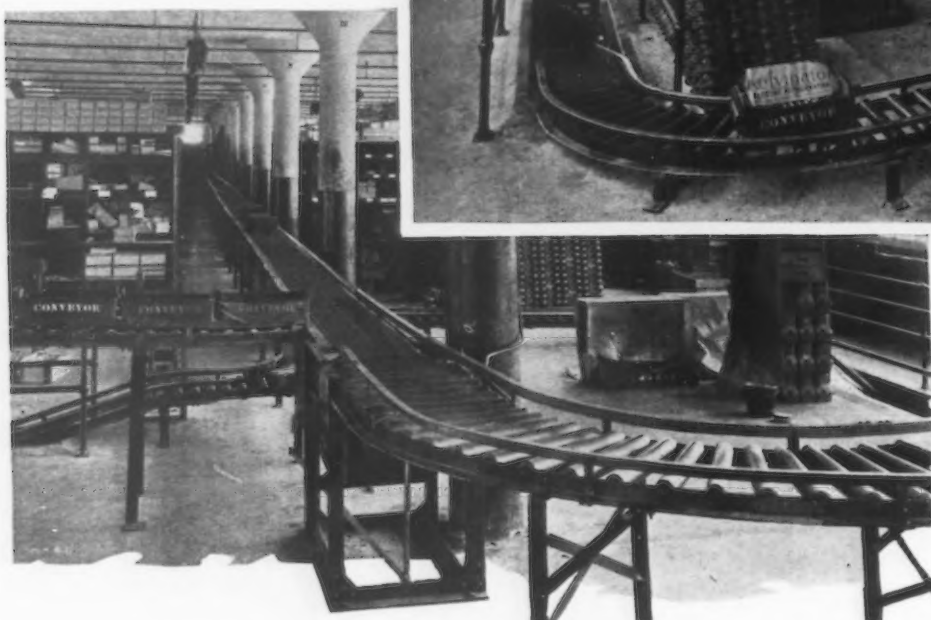
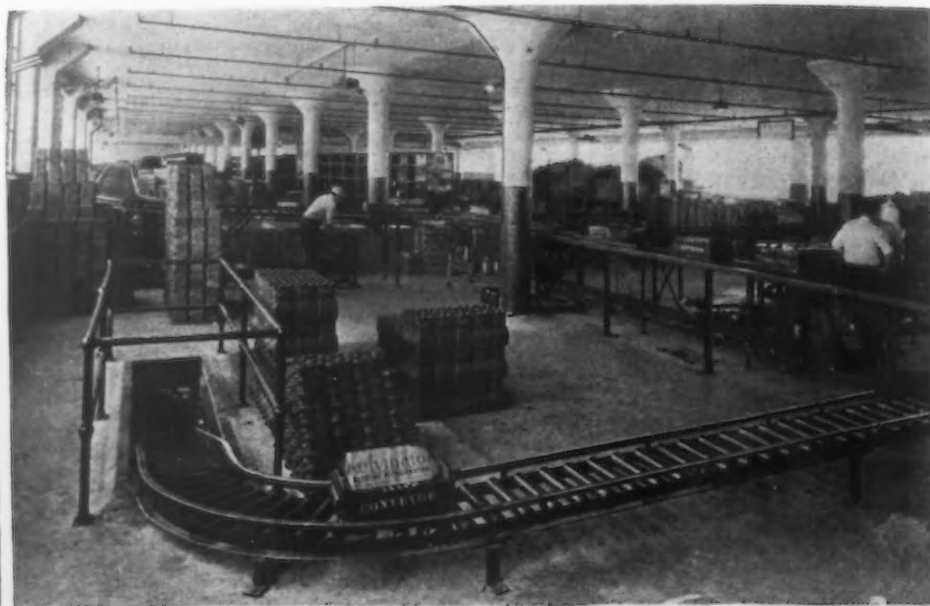
departments in which pressure controls, water valves, shut-off valves, expansion valves and float valves are assembled.

In the production of refrigerating units it is necessary to move from department to department hundreds of small parts. One of the most difficult problems confronting the management of the company was to find the most economical means of transportation for them. The plan finally adopted provided for standard all-steel tote pans, each measuring 14 in. in width, 19 in. in length and 11 in. in depth, and capable of carrying a maximum weight of 200 lb.

These pans, when once placed in service on the conveying system, remain in constant use and are not removed except at the end of the conveyor in the stockroom, where, after being emptied, they are transferred by hand to the lower run of the conveyor to move immediately back into the various departments of the plant. In many cases they are loaded with stock to go to assembly operations before being placed on the lower run of the belt. Holders, fitting snugly into the tote pans, are provided for each kind of part to be transported. The workmen remove these holders,

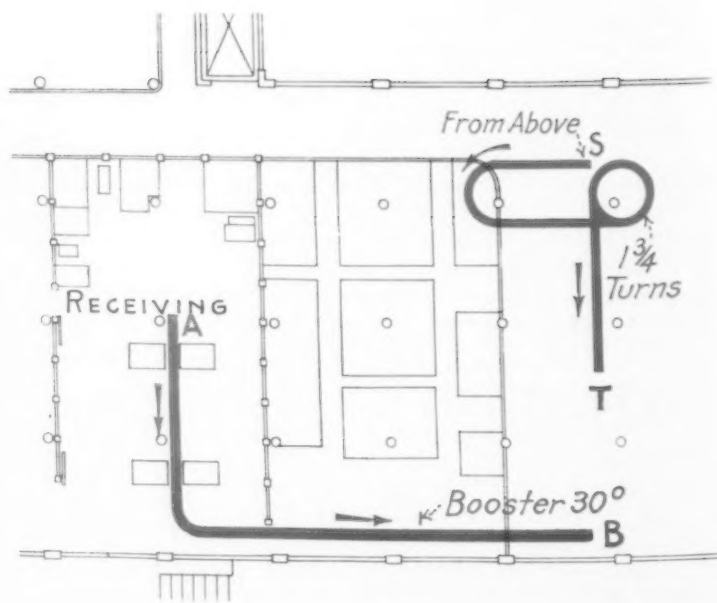
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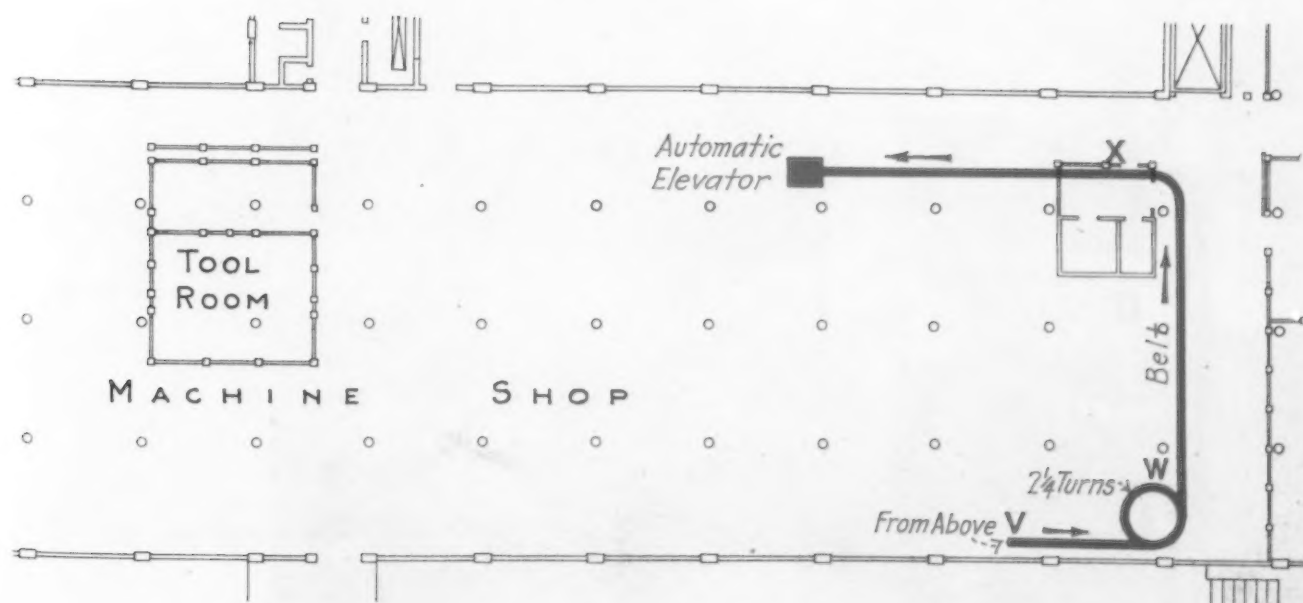
GRAVITY Conveyor
Along Left Wall
(Third Floor) Receives
Tote Pans from Booster
from First Floor and
Passes Them to Belt Con-
veyor Through Center of
Stockroom (Shown Also in
View Below.) Tote pans
coming to belt from right
are from vertical elevator.
Pans returned on lower
run of belt are deflected
to either side on roller
spirals. Man in center is
operating deflector

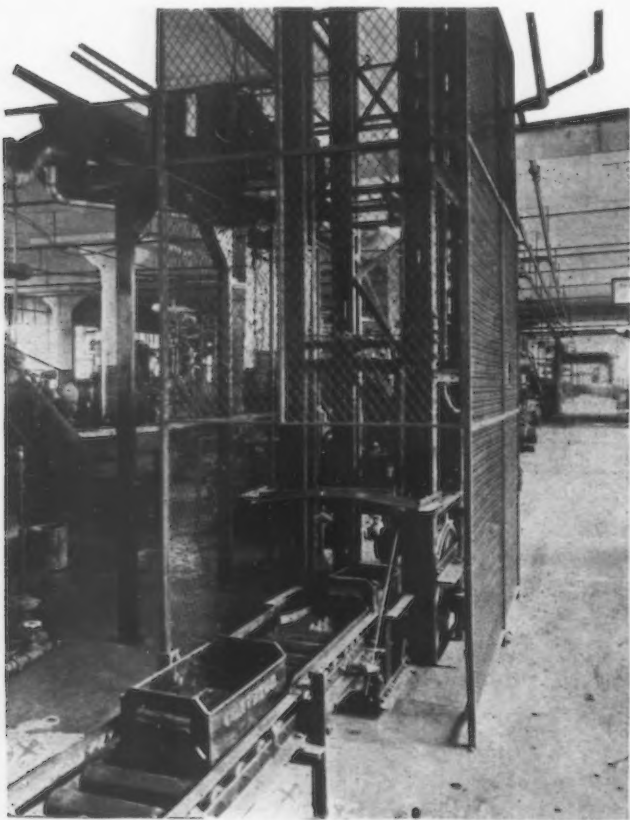


Floor Plans Show Interconnecting Units of System

CONVEYORS Connecting the Three Floors Are shown in Red on the Diagram. The floors are shown one above the other as they occur in the building, the one at top of page being the top floor. Materials, received at left end in lower floor, are placed on conveyor at *A* to go to the stockroom. At *B* they pass up through the floor to the second story on a booster conveyor with 30-deg. grade. This carries them through the second floor (*BC*) and to the third floor where, at *D*, the material is delivered to the belt conveyor *EF*, running lengthwise in the stockroom. A short conveyor *G* facilitates distribution of some of the material. From the stockroom, material going to various departments is placed on the lower run of the belt conveyor *EF* and may be switched off at either *L* or *P*, both of which lead down through the floor at 15-deg. slope into spirals on the second floor, which is the assembly department. What goes over *L* traverses the spiral *M* and is delivered to the belt conveyor *MN*. What goes over *P* traverses the spiral between *P* and *Q* and much of it is delivered on the line *RS*, which at *S* again goes down through the floor at 15-deg. grade to the first floor. Here, after making a loop and a spiral, the conveyor ends at *T* in the machine shop. Another conveyor *UV* in the assembly department takes other material to the other end of the machine shop, going down through the floor at 15-deg. grade at *V*. This traverses another spiral on the first floor, coming out at *W* and then, over a belt conveyor, feeds the line *X*, which leads to the automatic elevator. This elevator carries material up through the three floors, with delivery at each floor. In the stockroom it deposits material on the conveyor at *H*. This conveyor eventually leaves this floor at *J*, going down through the second floor over another spiral and ending up at *K*. All of these spirals are 11 ft. in diameter and of 3 to 3½ ft. pitch and are fitted with rollers, so that gravity carries the material downward in tote boxes

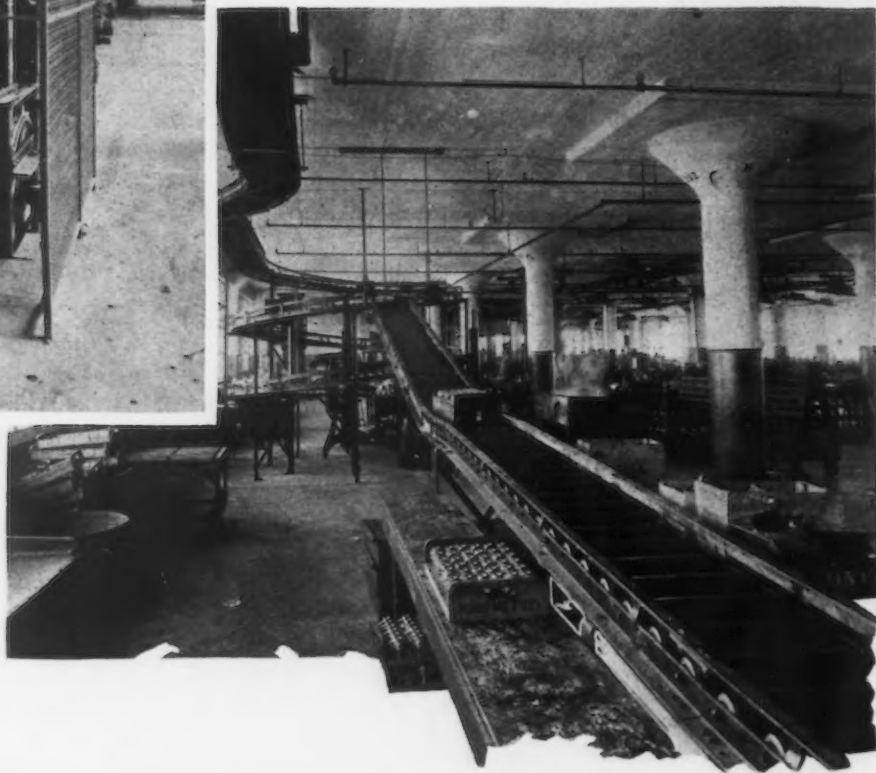




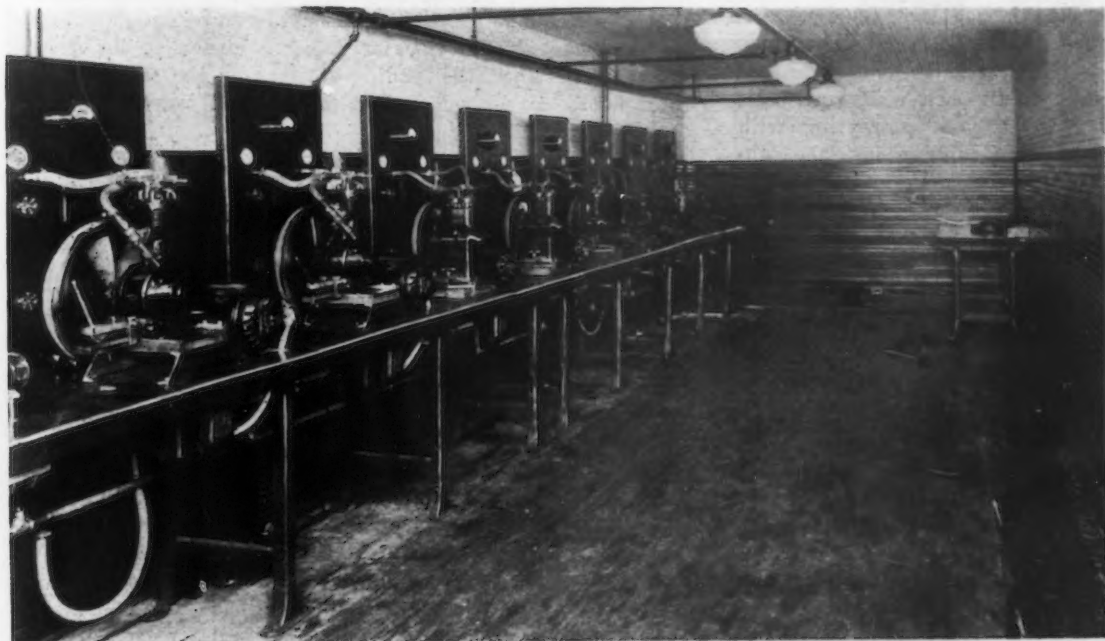


AUTOMATIC Loading Station, on First Floor, of Vertical Elevator (Above) Which Delivers Tote Pans from First-Floor Machine Shop to Third-Floor Stockroom

ROLLER Spiral on Second Floor (Below) Receiving from Gravity Conveyor Shown on Lower Left of Photograph at Top of Page 266. Note deflector, switch and switch arm, which are operated from floor above to discharge to gravity conveyor in foreground or to threaded belt. On loading table is shown the form of holder by means of which various parts are shipped in the tote pans



MONORAILS Carry Material Into and Through Dehydrating Ovens, Hanging Trays Being Used for the Reception of the Parts to Be Treated



*"SILENT
Testing"
of Compress-
sors, Which
Are Carried
Here from
End of Assem-
bly Line by
Means of an
Overhead
Chain Con-
veyor.*

*TAKE-UP End of Belt
(Threaded) Is Shown
at Right Coming Down
from Second Floor and
Delivering to Curve and
Roller Spiral on First
Floor. All spirals are 11
ft. in diameter, with pitch
of 3 to 3½ ft.*



*TOP Run and (Third
Floor) Discharge of
Vertical Elevator Are
Shown at Left. This grav-
ity roller conveyor deliv-
ers to stockroom belt as
shown at left on lower
photograph on page 266*

or racks, from the tote pans, but do not impede the movement of the latter.

Stockroom Control of Tote Pan Movement

ROUTING of the tote pans is regulated chiefly from the stockroom. Material to be delivered from stock to sub-assembly departments is placed in tote pans and sent out from the stockroom on the belt conveyor. This delivers it to spiral gravity conveyors connecting with various belt and gravity conveyors running into the sub-assembly departments. When the tote pans have gone the length of the assembly line to which they are assigned, and have been emptied of their contents, they may be held for use at the inspection point. If they are not needed there they may be returned to the stockroom for rerouting.

Raw stock coming into the plant is carried by means of an inclined conveyor from the receiving department on the first floor to the third floor, where the stockroom is located. The conveyor is equipped with standard pusher bars and runs at a speed of 60 ft. a minute. It delivers the stock, always in tote pans, to a gravity roller conveyor discharging on to a belt conveyor moving down the center of the stockroom. The belt conveyor consists of an upper and a lower run, material moving into the stockroom on the upper run and passing out on the lower.

Assembly work is done principally on the second floor. Material is delivered from the stockroom on the third floor to the belt conveyors along the assembly lines by means of spiral gravity conveyors, and assembled parts are carried to the storage and shipping departments on the first floor in a similar manner. The general plan of having material go from the first to the third floor and thence to the second and again to the first has been followed in laying out production lines in the plant, and the entire conveying system has been designed to conform to and facilitate this arrangement.

Special Arrangements Facilitate Some Operations

IN certain cases provision has been made for special carriers. For example, compressor units, after being painted, are placed on a special carrier suspended from an overhead monorail conveyor running into a continuous-type dehydrating oven. The carrier has three shelves, the bottoms of which are perforated so that material resting on them can dry easily. When the compressors come from the oven they are removed from the carrier and are tested under gas pressure for leaks. They then are charged with oil and are put on an overhead conveyor for delivery to the final assembly department, where they move into the condenser assembly line.

For the silent testing of compressors after assembly a special room has been set aside on the third floor. Compressors are carried there from the end of the assembly line on the second floor by means of an overhead chain conveyor.

Ice cream cabinet condensers are assembled on a continuous roller conveyor, but, on account of their bulk, weight and the peculiar requirements of the assembly operations, they are pushed by hand from one position to another. At the end of the assembly line they are placed on specially designed carriers and are moved on a monorail conveyor into a baking oven. From the oven they are transported on a vertical conveyor to the charging room on the floor below, where they are charged with sulphur dioxide and oil. From this point delivery is made by roller conveyor to the department where the condensers are assembled into the holding cabinets. Still on the roller conveyor, the unit is tested and then is sent to the crating room and to the warehouse for shipment.

Automatic Elevator Takes Machined Parts to Stockroom

MACHINED parts from the machine shop are delivered by means of a gravity roller conveyor on to an automatic pendant-type vertical elevator, to be taken

to the stockroom on the third floor. This stockroom serves for storage of both raw materials and finished parts ready for the assembling operations. The elevator is motor driven, and the loading stations at each floor are cable-controlled and are properly interlocked to prevent jamming the elevator. If the elevator is being loaded at the first floor, for instance, the loading stations on the second and third floors are locked so that no material can be fed on to the elevator.

The elevator, which loads and unloads automatically, is equipped with metal carriers each of which is just large enough to accommodate comfortably one of the tote pans. These carriers are spaced about 8 ft. apart and their speed can be regulated so as to conform to the movement of the tote pans discharging on to them.

Through the machine shop runs a belt conveyor along which parts in process move from one operator to the next. The lower run of the conveyor is used to carry chips from the machine shop, the chips being gathered in the tote pans.

Monorails are employed rather extensively, when they afford better facilities for transportation than roller or belt conveyors. For example, in addition to being used in carrying material into and through dehydrating ovens, monorails bring flywheels from the paint room and radiators from the sub-assemblies to the unit assembly department. Furthermore, a monorail has been erected through the stockroom and through the radiator, condenser coil, evaporator and tank assembly departments.

Considered as a whole, the system, which was designed and installed by the Kelvinator engineers, is comprised of 44 different units, many of which dovetail into each other. It has made possible the movement of materials at whatever speed or in whatever quantities are called for by production schedules, without the necessity of employing a constantly fluctuating number of workmen. The permanent decrease in the amount of man power has been sufficient in itself to account for a large reduction in costs. However, to state that these savings are all that has been accomplished would be omitting mention of the most important results. It has made practicable the economical manufacture of refrigerating units on a mass production basis, an achievement which would have been impossible of attainment were it not for the comprehensive mechanical transportation lines connecting the various operating departments.

Measures Temperature of Welding Flame

At the meeting of the Verein Deutscher Ingenieure, held at Essen, June 9 to 11, Prof. A. Henning described his experiments on the temperature of the oxy-acetylene flame. According to an abstract of the paper published in *Engineering*, the temperature was measured by Kurlbaum's methods, the flame being colored for that purpose with lithium carbonate. The flame was measured at a number of places at different heights above the edge of the burner and at different distances from the vertical axis. The proportions of acetylene and oxygen used were also altered. The maximum temperature, 3100 deg. C., was obtained with the ordinary proportion of 1:1 used in welding blowpipes. The acetylene pressure was 7 lb., and the oxygen pressure 45 lb. per sq. in.

Handling of Personnel

Industrial accidents, factory management, hours of work, fatigue and rest periods, lighting, heating, ventilation and sanitation are discussed in a 48-page mimeographed pamphlet issued by the Library of National Bureau of Casualty and Surety Underwriters, 1 Park Avenue, New York. It was prepared by Mildred B. Pressman and includes a review of general literature on these subjects, and literature on their relation to the questions of safety and production.

Carbon Deposition Near Furnace Top

No More Than a Third Can Come from Volatile Matter in Coke; Remainder Must Come from Blast Furnace Gases Themselves

BY F. C. HOWARD*

IT is generally acknowledged that the manufacture of pig iron is the very basis of the steel and ferrous alloy industries. Therefore any information on the chemical reactions involved is not only of scientific importance but may be of real economic value. A thorough understanding of these reactions is essential for the proper design of blast furnaces, and should be of real benefit to the furnace operator.

Many textbooks and articles speculate as to the reactions taking place and show the complete equations, but fail to take into consideration the steps involved or the rate of reaction and the equilibrium constants. However, there is much valuable data in the literature in which the physical chemistry involved has not been considered. Recent work done by the Bureau of Mines in the Birmingham district is of real interest and significance.

In Technical Papers No. 397 and 391, entitled "Composition of Materials from Various Elevations in an Iron Blast Furnace" and "Iron Blast Furnace Reactions," by S. P. Kinney, P. H. Royster and T. L. Joseph, tests are described which sampled both gases and solids at different levels in the iron blast furnace for a period of many days. The gas analyses represent the average of 1000 tests and should be fairly representative of furnace operation. The results are shown in Table I:

Table I—Gas Analyses at Different Levels in the Blast Furnace

	Height Above Tuyeres	Temp. Deg. C.	Per Cent by Volume			
			CO ₂	CO	H ₂	N ₂
Top Gas.....		168.0	9.9	28.1	2.0	60.0
Plane No. 1.....	60 ft. 4 in.	204.0	10.3	27.0	1.87	60.8
Plane No. 2.....	53 ft. 4 in.	465.5	12.1	26.5	1.69	59.7
Plane No. 3.....	41 ft. 9 in.	745.0	9.0	28.6	1.64	60.7
Plane No. 4.....	19 ft. 3 in.	853.0	1.1	33.6	0.8	64.5
Bosh.....		1350.0	0.0	34.1	0.79	65.1

It should be noted in connection with the above table that the CO content decreases steadily to a point 53 ft. 4 in. above the tuyeres, after which it begins to increase. The CO₂ content is zero at the bosh, increases steadily to the same point and then falls off. It should also be noted that percentages are given by volume, which is equivalent to molecular percentage.

We can assume that the nitrogen comes from the air and goes through the furnace unchanged. That the amount of nitrogen coming into the furnace with the coke is negligible is apparent from the following computations:

Burden: 2626 lb. coke; 2240 lb. iron; 9695 lb. air.
Analysis of coke: 0.6 per cent nitrogen; 1.0 per cent volatile.
Molecular weight air assumed at 29 (79.1 per cent nitrogen).
Molecular weight nitrogen is 28.
Mols air in blast = $9695 \div 29 = 334$.
(a) Mols nitrogen in blast = $334 \times 0.791 = 264$.
(b) Mols nitrogen in coke = $2626 \times 0.006 \div 28 = 0.56$.
Proportion (b) to (a) = $0.56 \div 264 = 0.00213$.
Correction for nitrogen in coke assuming all of it goes to gas
 $60 \times 0.00213 = 0.128$, a negligible correction.

The gas analyses were then recalculated on a basis of 60 mols of nitrogen and the results are shown in the following table:

Table II.—Gas Analyses at Different Levels in Blast Furnace
Mols of Gas per 60 Mols N₂

	CO ₂	CO	H ₂	N ₂
Top Gas.....	9.9	28.1	2.0	60.0
Plane No. 1.....	10.2	26.7	1.85	60.0
Plane No. 2.....	12.2	26.6	1.70	60.0
Plane No. 3.....	8.9	28.3	1.62	60.0
Plane No. 4.....	1.0	31.2	0.74	60.0
Bosh.....	0.0	31.4	0.73	60.0

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A recalculation of these analyses on the basis of 60 mols of nitrogen shows the total carbon in the gas and is given in Table III.

Table III—Total Carbon in Gas—Mols per 60 Mols N₂

Position	Total Carbon	Position	Total Carbon
Top Gas.....	38.0	Plane No. 3.....	37.2
Plane No. 1.....	36.9	Plane No. 4.....	32.2
Plane No. 2.....	38.8	Bosh.....	31.4

It is of real significance to note that the total carbon in the gas increases steadily from the bosh to Plane No. 2. At Plane No. 1 the total carbon decreases and then increases in the Top Gas. This would seem to indicate that there is a deposition of carbon between Plane No. 1 and Plane No. 2, a fact which was brought out in the oxygen calculations of Technical Paper No. 391, cited above.

A calculation shows that this increase between Plane No. 1 and the top of the furnace cannot be due to carbon coming from the volatile matter. Coke is 1 per cent volatile. Assuming a formula for this volatile matter to be n(CH₂) it is 86 per cent carbon.

Mols carbon from volatile = $2626 \times 0.01 \times 0.86 \div 12 = 1.88$.
Molecular proportion carbon from volatile to nitrogen from blast = $1.88 \div 264 = 0.0071$.
Total carbon from volatile per 60 mols N₂ = $0.0071 \times 60 = 0.4$.

Total carbon in top gas from Table III is 38.0 mols and 36.9 at Plane No. 1, or an increase of 1.1 mols. Compare this with 0.4 mol of carbon which it might have received from the coke as volatile matter.

This work strongly indicates that the deposition of carbon in the top of the blast furnace comes from the blast furnace gases themselves. In this particular case it amounts to 1.9 mols as compared with 0.4 mol that might be deposited from volatile matter in coke, and hence is greater in amount than would be obtained if volatile matter only were decomposed.

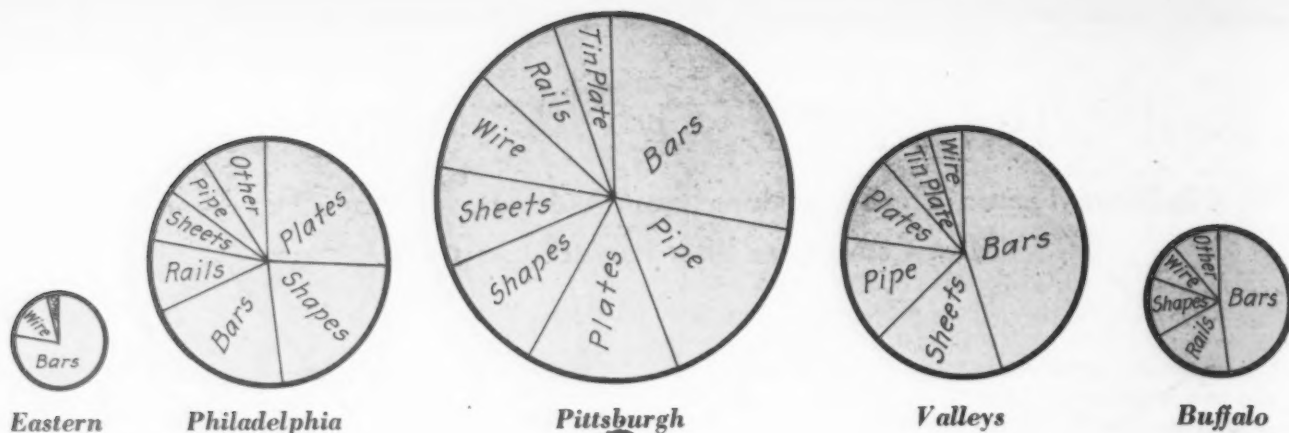
The following table shows the total mols of gases per 60 mols of N₂, exclusive of N₂:

Table IV—Mols of Other Gases per 60 Mols N₂

Position	Total Gas Except N ₂	Position	Total Gas Except N ₂
Top Gas.....	40.0	Plane No. 3.....	38.8
Plane No. 1.....	38.8	Plane No. 4.....	32.9
Plane No. 2.....	40.5	Bosh.....	32.1

It will be noticed that there is an increase from 32.1 to 40.5 mols in the total gases from the bosh to Plane No. 2, then a decrease of 1.7, after which it returns to 40. In other words, the total volume of gases leaving the furnace is not as great as that present in the furnace at Plane No. 2.

There is no apparent reason for a variation of 1.1 mols of carbon in the gases between Plane No. 1 and the top gas (Table III). Either there are reactions involving carbon which we have not considered or the furnace was not running at a uniform rate. Considering the size of the equipment, variation in material, differences in the technique of the operators and other incidentals, the latter presumption may be correct. If such is the case, the use of these data for a qualitative study of the reactions of the blast furnaces are of value, but it would not be so safe to use them for quantitative deductions about the furnace's reactions.



United States Rolling Mill Capacity

Compilation of Rated Outputs of Leading Forms of
Steel in Each of Twelve Districts
of the Country

THREE years ago last January THE IRON AGE published several pages of tables and a map showing the location and capacity of all of the steel rolling mill units in the country. The tables indicated the subdivision of the rolling capacity for each type of product, showing how much could be produced at each plant in each district under each class of product. The total rolled capacity was there computed, as of Dec. 31, 1922, at 43,157,845 gross tons.

The figures have now been brought up to date. Reference was had to the 1926 directory of the American Iron and Steel Institute—the latest comprehensive publication of that character, and, in addition, verification or correction was made by more than 200 companies for the individual figures appertaining to those companies.

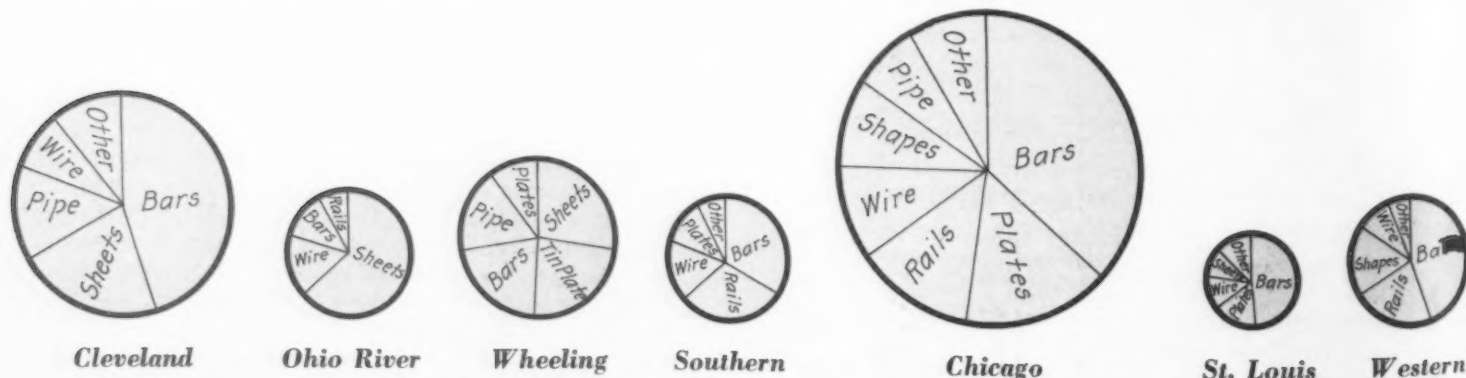
Representing as nearly as possible the situation on Jan. 1, 1928, the tables and diagrams shown herewith indicate the capacity of various districts and how those districts are equipped to various forms of steel. The total capacity appears to be 52,196,000 tons, or 21 per cent greater than five years earlier. The districts, somewhat loosely drawn, are shown on the map.

One of our diagrams shows the relative capacity of the different districts in the production of nine specific, leading items. Each circle has an area proportioned to the others in the ratio of the tonnage capacity of the different prod-

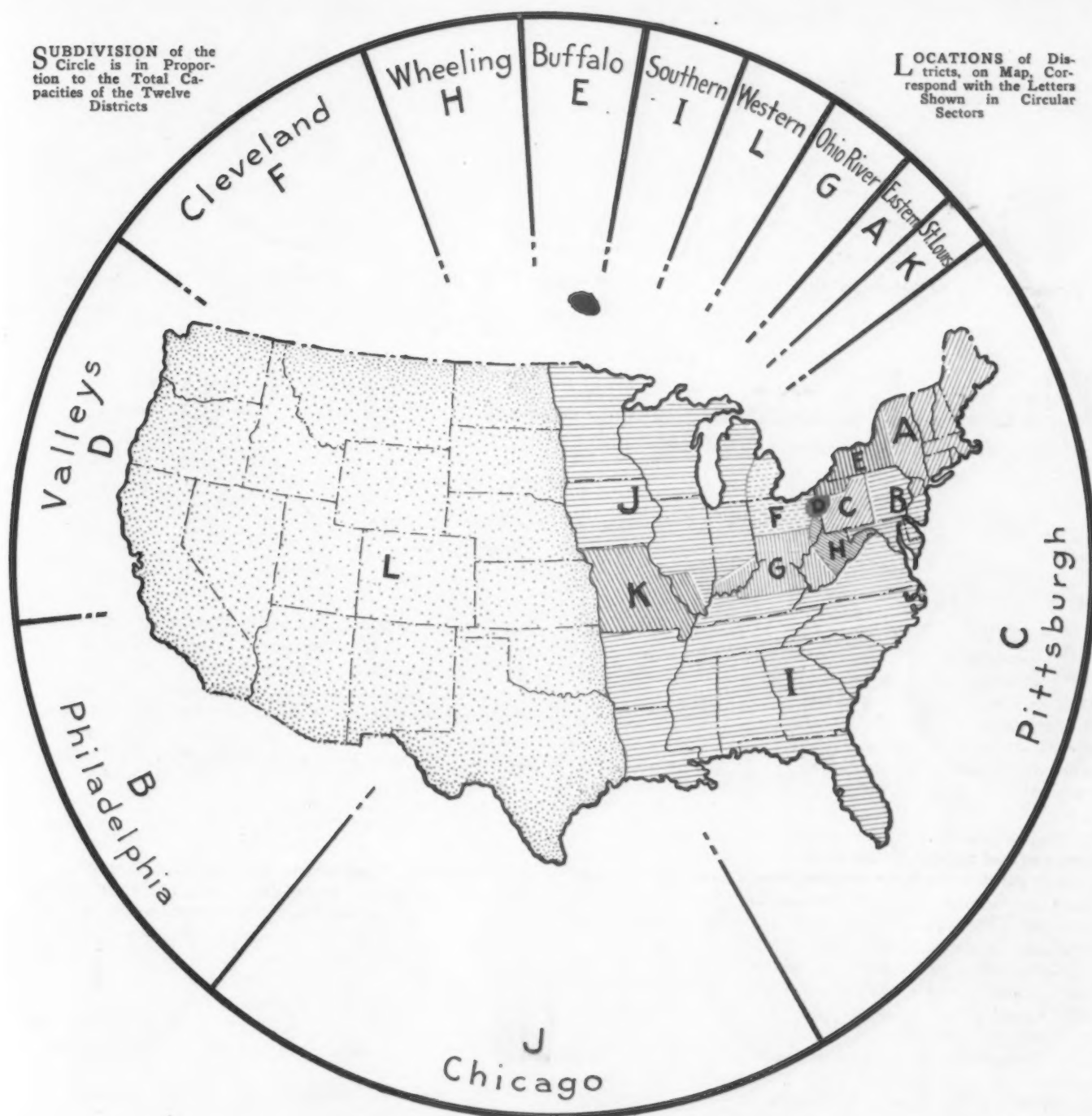
ucts. Except for rails, in which Chicago leads, the Pittsburgh district is the dominating influence in each product. Pittsburgh's share varies from 20½ per cent of the aggregate in sheets to 44 per cent of the tubular products. The Pittsburgh district has 26.9 per cent of the total capacity. Chicago's lead in rails is represented by 30.3 per cent of the total, against Pittsburgh's 23.4 per cent.

Another diagram shows the subdivision of the capacity of each district into the leading items of product. In most of the districts bars furnish the principal item. This reaches nearly 76 per cent in the small Eastern district, but drops to below 12 per cent in the Ohio River district. Plates take the lead in the Philadelphia district, while sheets in both the Wheeling and the Ohio River districts are ahead of all other products. In the latter, in particular, sheets account for more than 65 per cent of the total. Considering sheets and tin plate together, more than half of the total capacity of the Wheeling district is thus covered. Here, as in the other diagram, the area of each circle bears the same proportion to the other circles as the capacities of the respective districts.

While the total capacity for finished rolled product is placed at 52,196,000 tons, an increase of 21 per cent over the capacity at the end of 1922, no such increase has been made in the ingot production capacity of these plants. This is reported in the present table at 59,973,000 tons, against



Principal Products of Each District Are Shown at Top and Bottom of Page. Areas of circles are proportional to total capacity, district by district



ANNUAL CAPACITY OF FINISHED ROLLED IRON AND STEEL IN THE UNITED STATES ON JAN. 1, 1928,
SUBDIVIDED INTO TWELVE PRODUCING DISTRICTS

SUBDIVISION OF FINISHED ROLLED PRODUCT
(Thousands of Gross Tons)

Districts	No. of Plants	Total Ingots	Total Finished Rolled Product	Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Incl. Seamless Tubes)	Wire Rods	Plain Wire (Net Tons)
A—Eastern	29	547	828	....	....	4	628	....	....	30	166	213
B—Philadelphia	58	7,148	6,382	588	1,655	1,458	1,334	426	182	386	355	344
C—Pittsburgh	76	15,201	14,044	1,058	1,840	1,532	3,879	1,317	697	2,418	1,305	1,216
D—Valleys	30	7,624	6,067	....	645	....	2,722	1,089	471	870	270	236
E—Buffalo	18	2,678	1,983	400	100	250	926	130	....	....	177	100
F—Cleveland	31	6,136	4,819	207	255	....	2,165	1,036	65	633	458	481
G—Ohio River	16	1,898	1,462	111	....	....	172	959	....	....	220	210
H—Wheeling	30	3,308	2,530	....	260	....	539	696	608	427	....	....
I—Southern	14	1,797	1,584	433	198	48	566	91	....	....	248	290
J—Chicago	48	11,281	10,126	1,373	1,566	914	3,730	531	272	738	1,002	1,038
K—St. Louis	9	740	814	....	128	38	395	86	67	....	100	....
L—Western	12	1,615	1,557	360	5	245	717	66	....	....	164	187
Total	371	59,973	52,196	4,530	6,652	4,489	17,773	6,427	2,362	5,502	4,465	4,315

WHAT MAKES UP THE STEEL OUTPUT OF EACH DISTRICT

District	Total Finished Rolled Product	Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Incl. Seamless Tubes)	Wire Rods
Percentage of District Total in Each Product									
A—Eastern	100.0	....	....	0.5	75.8	....	....	3.6	20.1
B—Philadelphia	100.0	9.2	25.9	22.8	20.9	6.7	2.9	6.0	5.6
C—Pittsburgh	100.0	7.5	13.1	10.9	27.6	9.4	5.0	17.2	9.3
D—Valleys	100.0	....	10.6	....	44.9	17.9	7.8	14.3	4.5
E—Buffalo	100.0	20.2	5.0	12.6	46.7	6.6	....	....	8.9
F—Cleveland	100.0	4.3	5.3	....	44.9	21.5	1.4	13.1	9.5
G—Ohio River	100.0	7.6	....	....	11.8	65.6	....	....	15.0
H—Wheeling	100.0	....	10.3	....	21.3	27.5	24.0	16.9	....
I—Southern	100.0	27.3	12.5	3.0	35.7	5.8	....	....	15.7
J—Chicago	100.0	13.6	15.5	9.0	36.8	5.2	2.7	7.3	9.9
K—St. Louis	100.0	....	15.7	4.6	48.6	10.6	8.2	....	12.3
L—Western	100.0	23.1	0.3	15.7	46.1	4.3	....	....	10.5

Bars

Showing Contributions of Districts to Total Capacity in Nine Products



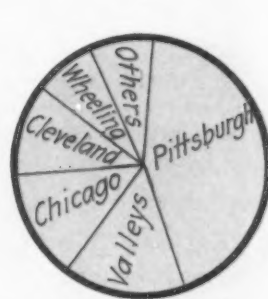
Sheets



Plates



Pipe



Shapes



Rails



Drawn Wire



Wire Rods



Tin Plate

HOW MUCH OF EACH FORM OF STEEL IS MADE IN EACH DISTRICT

District	Total Ingots	Total Finished Rolled Product	Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Incl. Seamless Tubes)	Wire Rods	Plain Wire (Net Tons)
Percentage of Each District to the Total United States											
A—Eastern	0.91	1.59	....	....	0.09	3.53	....	....	0.54	3.72	4.93
B—Philadelphia	11.92	12.23	12.97	24.88	32.47	7.50	6.63	7.71	7.01	7.95	7.97
C—Pittsburgh	25.35	26.91	23.36	27.66	34.13	21.82	20.49	29.49	43.95	29.22	28.18
D—Valleys	12.71	11.62	....	9.70	....	15.32	16.95	19.94	15.81	6.05	5.47
E—Buffalo	4.47	3.80	8.83	1.50	5.57	5.21	2.02	....	....	3.96	2.33
F—Cleveland	10.23	9.23	4.57	3.83	....	12.18	16.12	2.75	11.51	10.26	11.15
G—Ohio River	3.16	2.80	2.45	....	....	0.97	14.92	....	....	4.93	4.87
H—Wheeling	5.52	4.85	....	3.91	....	3.03	10.83	25.75	7.76	....	....
I—Southern	3.00	3.04	9.56	2.98	1.07	3.19	1.42	....	....	5.56	6.72
J—Chicago	18.81	19.39	30.31	23.54	20.37	20.99	8.25	11.52	13.42	22.44	24.05
K—St. Louis	1.23	1.56	....	1.92	0.84	2.23	1.34	2.84	....	2.24	....
L—Western	2.69	2.98	7.95	0.08	5.46	4.03	1.03	....	....	3.67	4.33
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

55,522,000 tons for five years ago. The increase in ingot capacity has been thus only 8 per cent.

Figuring the ratio between rolled steel production and ingot production at 74 per cent, which is about the yield of finished steel which ingots have been producing in the past few years, the ingot capacity reported has called for a finished steel capacity of about 44,400,000 tons. The rolling capacity reported, however, is in excess of that amount by 17½ per cent.

This follows natural conditions, inasmuch as requirements vary from year to year, and rolling mill capacity always has to be in excess in the total of the probable requirements. Rail mills are thoroughly busy only a small portion of the year, and for the most part are not used for other products; similarly with other types of mills which are suited to only a narrow range of output. It happens, how-

ever, that the finished rolled capacity today is considerably further above the 74 per cent ratio to ingots than was the case five years ago. Evidently the several forms of steel made in a given plant are not likely to be simultaneously in full demand. Using the capacity figures given and the production figures for the various items as reported in *THE IRON AGE* of May 17, page 1401, we find that capacity was used in 1927 about in the following average proportions:

Rail making capacity at 62 per cent.
Plate mill capacity at 56 per cent.
Structural shapes at 83 per cent.
Merchant bars, etc., at 32 per cent.
Sheets at 62 per cent.
Tin plate at 81½ per cent.
Tubular products at 72½ per cent.
Wire products at 62 per cent.

Blowing Materials into Blast Furnace

German Experiments with Ore and Fuel Additions to Hearth Through Tuyeres—Problems Far from Solved

BLOWING ore and fuel into the hearth of the blast furnace was discussed in an interesting article in *Stahl und Eisen*. It was contributed by E. Bertram of the Halberger plant at Brebach-Saar, Germany, and gives a brief account of tests carried out at that plant since 1917.

Blowing in Dust Through Tuyeres

Tests were first made covering the use of flue dust. An arrangement was worked out by which flue dust could be taken from one of the large dust catchers and introduced into a pipe leading into the tuyeres. Details of the arrangement are not given. With good operation, the blast carried the flue dust smoothly into the furnace without producing dirty tuyeres. Also the dust production of the furnace did not increase even after long blowing.

From the first test it was observed that the dust exerted a cooling effect. If the furnace operation remained unchanged, it was not possible to produce No. 3 foundry iron, completely saturated with carbon. A partially saturated iron was made that was used directly for castings. As the chemical composition, otherwise, was hardly changed, the reason is probably to be sought in a change in the physical constitution.

Further it was noticed that, with the blowing in of large amounts of dust and with even furnace operation, the quality of the iron was not so good. The explanation is that an undesired lowering of hearth temperature is brought about. This can be avoided only by an increase of coke in the charge. Under the conditions at the Halberger plant, calculations based on tests showed that the blowing in of dust is economical, compared with briquetting, only when not more than 30.5 lb. of coke per ton of pig iron has to be added to the charge.

The process is economical only when the furnace is working with a great excess of temperature which has to be equalized with cold air additions to the blast. Whether it is to be recommended for the production of pig iron for steel making is to be doubted, as the reduction of manganese and other reactions will, without doubt, be influenced unfavorably.

The blowing in of fuels is much more difficult to carry out. After many failures a screw-feed was worked out that carried the material uniformly to the tuyeres and now from 10 to 50 per cent of the coke charge can be blown in as fuel additions. Tests showed that coal mud, raw coal, coke

dust and small coke cannot be used, at least so long as they are introduced into the chief blast main. In comparison with the effect produced by putting blast from a hot stove on to a cold working furnace, that produced by blowing in dry coke dust is sadly wanting. What is needed in such a case is not more fuel, but higher temperature. Blowing in cold fuel lowers the temperature. So long as oxygen is not mixed with the air nor the fuel preheated, this will always be the case.

The tests at the Brebacher plant have shown that the hope is unfortunately only a dream that, when a feeding arrangement of fuel to the hearth was worked out, a blast furnace would operate like a machine. Also the blowing in of cheaply made producer gas above the tuyere level appears to be an untenable practice. There remains only the hope that flue dust and fuel can be blown into the shaft of the furnace. In this way the cost of briquetting will be saved and the material will be preheated when brought into the hearth. However, the necessary arrangements cost money and the heat balance of the furnace requires that, with a large amount of flue dust addition, a corresponding increase of coke be made to the charge.

Results Summarized

The author's summary is that the blowing in of ore or flue dust gives rise to no difficulties with a blast furnace working under low pressure. It is not a suitable practice for the production of high-quality foundry iron or irons high in manganese, and is economical only if one is running with the object of producing gas or if considerable cold blast has to be used to equalize temperature.

Blowing in fuel gives rise to operating difficulties. Tests and theory show that the process is unworkable so long as fuel is introduced into the main blast line. There still remains the possibility of working out improved methods of introducing fuel to the furnace hearth. G. B. W.

"Getting Facts About Accidents," the second of a series of publications issued by the Policyholders' Service Bureau of the Metropolitan Life Insurance Co., New York, outlines current industrial practice in obtaining and using accident facts as a means of promoting plant safety. Accident forms are provided, which have been found helpful in recording the necessary facts and making them available for study.

Economies in Automatic Welding

Lowest Costs Require a Rapidly Melting Electrode of Proper Size and Correct Balance Between Current Input and Speed of Welding Head

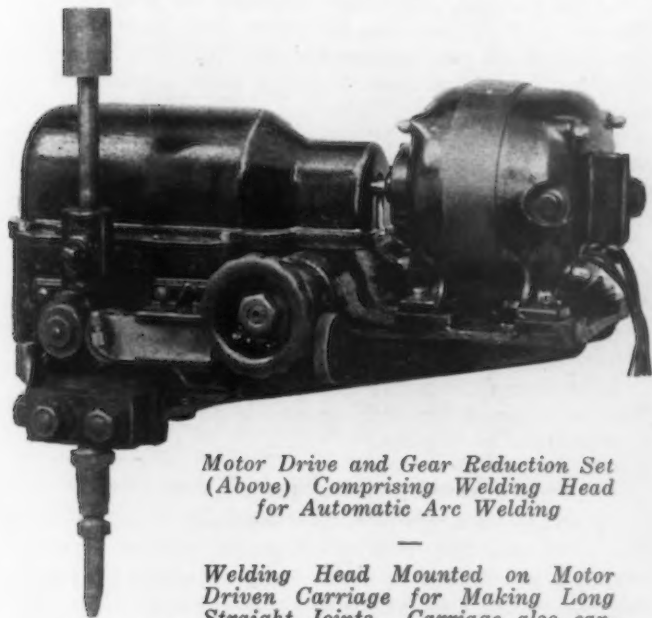
BY M. W. BREWSTER*

HAVING adopted welding as a cheaper or more satisfactory process than others, the next question is, "How can welding operations be speeded up to obtain the maximum output at a minimum cost?" Naturally, quality must not suffer. In the following discussion, the principal variables affecting operating costs will be considered.

It will be assumed that (1) handling charges have been

and measure the welding variables when their regulation is automatically controlled. The principles discussed, however, are equally applicable to hand welding operation. It is interesting to note that the automatic welding machine originated as a piece of research apparatus for studying certain aspects of hand welding.

A bead on a flat plate was used because it eliminated other variables such as joint preparation, backing up, and



Motor Drive and Gear Reduction Set (Above) Comprising Welding Head for Automatic Arc Welding

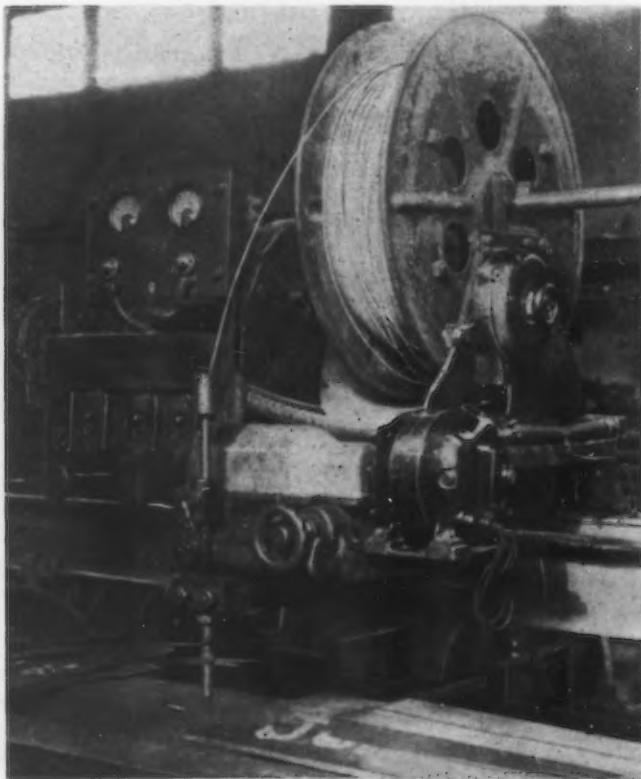
Welding Head Mounted on Motor Driven Carriage for Making Long Straight Joints. Carriage also carries reel of welding wire, current control, and indicating meters

reduced to a minimum, (2) the clamps or other fixtures used for holding or moving the product while it is being welded are correctly designed, (3) if the welds can be backed up, it has been effectively done, (4) disturbing magnetic influences have been reduced to a minimum, (5) the material to be welded is flange quality steel and (6) the joints are properly assembled and, if necessary, beveled on the edges. These are either plant layout or machine design problems. Our investigation is confined to a study of reducing welding costs by a proper balance of welding conditions only.

The following motions, materials and conditions remain to be considered:

1. The rate of electrode feed.
2. The rate of travel along the weld.
3. The kind or type of electrode.
4. The diameter of the electrode.
5. The value of welding current.
6. The voltage across the arc.

In order to determine the optimum conditions, the rate at which a satisfactory bead can be laid on a flat steel plate, as affected by the above variables, was studied. An arc welding machine was used because it is easier to control



the need for giving special attention to magnetic disturbances. It is not assumed that a bead on a flat plate is equivalent to a weld in a joint, but regardless of whether a joint or bead is considered, if by raising the current increased speed can be employed, there will be a saving in welding cost. Likewise changes in electrode diameter and type of electrode may effect savings in welding. The object being as stated above, the use of a bead on a flat plate is preferable to some arbitrarily selected type of joint because fewer welding variables are involved.

The physical dimensions of a bead made with No. 1 wire, $\frac{1}{8}$ -in. diameter, using 190 amp. and a travel speed of 15 in. per min. was arbitrarily selected as a standard. This bead possessed the qualities generally required of satisfactorily deposited weld metal. Good appearance, adequate penetration and absence of noticeable porosity were considered sufficient evidence of a "satisfactory" bead. The limits of current and speed were considered as reached when any one of these suffered. Practically all the inspection was made without destroying the bead because it is believed that a

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familiar type of weld or bead can be adequately judged without doing so, the same as the probable soundness of riveted joint can be determined without testing it to destruction.

Rate of Electrode Feed

If the motion of a hand arc welding operator is analyzed, it may be divided into travels in two directions: (a) along the direction of the weld, and (b) down toward the work in order to hold the arc length constant as the electrode is consumed. In automatic welding the second motion—that of feeding the electrode downward as it is consumed—is obtained by a wire-feeding device, easy to vary and capable of fine adjustment, called a welding head. The wire feed down through the vertical tubes, shown in the accompanying reproductions of photographs, is easily adjustable over a wide range by proper rotation of the two rollers with milled edges. Control is so devised that practically any predetermined voltage used in metallic arc welding can be held.

The rate of electrode feed depends primarily upon welding current and the melting rate of the electrode. This melting rate has an important effect on the ultimate speed at which a good weld can be obtained and will be considered further.

Rate of Travel Along the Weld

The travel along the weld may be obtained either by moving the work past the welding head or by mounting the welding head on a carriage that moves the head along the work in the direction of the weld. On a standard travel carriage, such as that shown, speed may be varied from 3½ to 80 in. per min.

It is desirable to observe certain important welding conditions. Too much emphasis cannot be placed on an even, smooth travel when working at the highest possible speed. To this end, final reduction of the movement should be through a worm gear. A small disturbance in any one of the welding conditions will result in a slower ultimate welding speed. Needless to say this travel movement should be easy to vary in small steps over and above the probable welding range. Uneven, jerky travel is particularly objectionable.

Melting Rate of Electrode

Of the many kinds of electrodes available, it is impossible to class any as definitely good or bad because of the lack of a standard for comparison. Some are good for one job, some for another. The proper plan is to select the one best suited for the particular job.

The first consideration, not only of the electrode problem in particular but of any welding job, is the qualities desired at the joint. The relative importance of strength, ductility and resistance to leakage or corrosion should be carefully considered. Other items that should be given attention are the design of the joint, the heat treatment, if any, and whether the joint is to be machined or ground.

In order to bring out another item often neglected, let it be assumed that several electrodes give welds that meet the conditions desired. Then select the one that will do the job at the highest speed. This depends not only on the electrode diameter and the welding current, but also on the melting rate of the electrode. Consideration of this factor is often neglected.

That the melting rate of the electrode differs may be seen from the curves in the accompanying chart, determined by making a satisfactory bead on a flat plate, as described. The diameters of the electrodes are identical and the metal of the two welding wires is of the same analysis. The electrodes differ in the fluxes used and the method of combining them with the electrode. The melting rate averages about 40 per cent less for No. I wire than for No. II. Similar results have also been obtained with one or two other types of electrodes.

Melting rate curves are seldom available to the shop foreman. It will be interesting to consider a case where these curves were not at hand. It was found that with 190 amp., ⅛-in. diameter electrode, and travel speed of 15 in. per min., a satisfactory bead could be obtained with No. I electrode, the wire feed being 14 in. per min. With No. II wire, and the same conditions otherwise, the wire feed was found to be 26 in. per min., indicating that the second electrode had 46 per cent greater melting rate. The bead made with the second type wire looked a little heavier but the apparent difference was slight.

The next step was to increase the current and travel speed on each type of wire until a limit was reached. With the first type of wire, the limiting condition for the kind of bead desired was 240 amp. at a travel speed of 18 in. per min.; with the wire with the higher melting rate, the limiting condition was 265 amp. and 24 in. per min. travel. It will be seen that the travel speed along the line of weld was 25 per cent faster when the electrode with the higher melting rate was used.

It is obvious from the example cited that, other conditions being equal, the melting rate is an important factor in speeding up production.

Larger Electrodes for Poorly Fitting Joints

In automatic welding, a ⅛-in. electrode is seldom used with a welding current over 200 amp.; hence in the above work a 3/16-in. electrode of the same type was tried using the same welding conditions as employed with ⅛-in. wire; namely, welding current 265 amp., and travel speed 24 in. per min. The electrode consumption with ⅛-in. wire was 44 in. per min., which, with a welding speed of 24 in. per min., gives a deposition of electrode of 0.076 lb. per ft. of weld. With 3/16-in. wire the electrode feed was 16 in. per min., which, with a welding speed of 24 in. per min., gives a consumption of 0.061 lb. of electrode per ft. of weld. These data illustrate that when the work consists of making a weld in abutting plates, and not laying down the

Tabulated Welding Conditions and Costs for Beads on a Flat Plate of Mild Steel

Comparison Group	Type of Electrode	Electrode Diam., Inches	Welding Current in Amperes	Travel Speed, in. per Min.	Electrode Consumption		Electrode per Lb. at \$0.09	Energy at \$0.02 per kwhr.	Costs in Dollars per Foot of Bead			Total Cost at Following Hourly Labor Cost		
					in. per Min.	Lb. per Foot			Labor at Hourly Cost of			Hourly Labor Cost		
									\$0.50	\$0.70	\$0.90	\$0.50	\$0.70	\$0.90
Comparison of melting rates														
A	I	$\frac{1}{8}$	190	15	14	0.038	0.0035	0.005	0.034	0.047	0.061	0.043	0.056	0.070
	II	$\frac{1}{8}$	190	15	26	0.070	0.009	0.005	0.034	0.047	0.061	0.048	0.062	0.075
Determination of maximum speed for each type of electrode and its effect on cost														
B	I	$\frac{1}{8}$	240	18	20	0.044	0.0035	0.0057	0.029	0.04	0.051	0.038	0.049	0.060
	II	$\frac{1}{8}$	265	24	44	0.076	0.0068	0.0044	0.021	0.03	0.039	0.032	0.041	0.050
Effect of increase in wire size when excess current is used on smaller size														
C	II	$\frac{1}{8}$	265	24	44	0.076	0.0068	0.0044	0.021	0.03	0.039	0.032	0.041	0.050
	II	$\frac{7}{16}$	265	24	16	0.061	0.0055	0.0044	0.021	0.03	0.039	0.031	0.040	0.049
Effect of increase of current on speed and cost														
D	II	$\frac{7}{16}$	265	24	16	0.061	0.0055	0.0044	0.021	0.03	0.039	0.031	0.040	0.049
	II	$\frac{7}{16}$	320	31	22	0.066	0.006	0.0039	0.016	0.023	0.030	0.027	0.033	0.040

maximum amount of metal, it may be advantageous to increase the size of electrode because less electrode material is removed from the larger diameter wire at a given current and travel speed.

There are, of course, other factors equally important to be considered with reference to electrode diameter. Larger diameter electrodes permit heavier currents which tend to increase the speed. The type of joint also has a share in determining the electrode diameter. Poor fitting joints are uneconomical for welding when tight fitting joints can be made. In some few applications, however, it happens that the saving in welding cost does not justify the extra joint preparation to secure an altogether suitable fit. Small diameter wire, of course, can be used for a large bead, but will result in slower welding speed and very often a poorer quality of weld metal. In such applications where a considerable opening has to be filled or spanned by the weld it is generally found that the larger the diameter wire that can be used, the more satisfactory the finished product will be.

It is clearly shown in the chart that the melting rate of the electrode increases as the current is increased. This makes a given type of bead at a higher speed. It has also been shown that there may be a saving in electrode consumption by changing from a $\frac{1}{8}$ -in. to a $\frac{3}{16}$ -in. electrode, the welding current remaining the same. It will be shown later that an increased welding current resulted in a slightly higher electrode cost, but a decrease in the labor and power cost per foot of weld.

Voltage Across the Arc

The arc voltage is usually a measure of the length of the arc; the longer the arc the higher the voltage for any given type of electrode of a specified diameter. It is generally agreed that, although the proper arc length will not alone insure a good weld, a long arc generally results in a poor weld. With a short arc there is a greater heat concentration. With bare electrodes the long arc is more unstable than the short arc; the greater the arc length the more opportunity for the absorption of oxygen and nitrogen by the weld metal. This absorption is detrimental to the quality of the weld.

Because of the better control of conditions possible with the automatic arc welding machine, stable conditions can be obtained with longer or shorter arcs than can be held by the average hand welder. With all other conditions except the arc voltage at the same value, it will be found that a short arc makes a narrower bead with a higher crown and a sharper curvature. As the arc length is increased, the bead widens out and flattens down until either the arc becomes unstable or the quality of the bead suffers from excess absorption of gases from the atmosphere. Whether a limit is first reached to the flatness of the bead or to the quality of weld metal is dependent, to a large extent, on the type of electrode used—highly fluxed electrodes generally permit the use of higher arc voltages.

Calculation of Costs

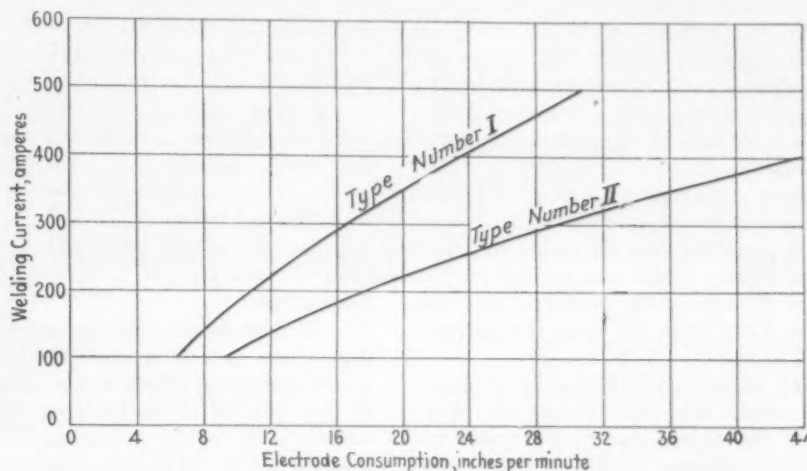
Three principal items to be considered in calculating welding costs are labor, electrode material and power.

Since the greater amount of welding, particularly automatic welding, consists of making linear joints or seams, cost calculations will be based on the cost per linear foot. The welding data used will be that employed in the preceding portion of this discussion, assembled in the table.

In order to bring out the points illustrated in the earlier part of this article, the data have been divided into four groups. Group A compares the melting rate of No. I and No. II wire. Group B gives the conditions of the highest speed with $\frac{1}{8}$ -in. diameter wire of both types. Group C illustrates the saving effected by changing to larger diameter of electrode,

other conditions remaining the same, and Group D shows the economy of increasing the current to obtain high welding speeds. This last point may also be illustrated by comparing the results with No. I wire in Group A with those of No. I wire in Group B. The same comparison may be made with No. II wire in these same groups.

In calculating electrode costs, the following electrode



Curves Showing Melting Rates of $\frac{5}{32}$ -In. Electrodes of Different Types

weights were used:

$\frac{1}{8}$ -in. electrode.....0.0409 lb. per ft.

$\frac{3}{16}$ -in. electrode.....0.0902 lb. per ft.

Power costs in general are calculated by finding the kilowatt input to the motor-generator set for a given welding current. To obtain this, it is necessary to have the efficiency curve of the motor-generator set used.

The following formulas give cost per running foot of weld:

To find the electrode cost in dollars per foot of bead multiply the electrode feed in in. per min. by the weight of the electrode per ft. of bead and by the electrode cost in dollars per pound, and divide the running product by the travel speed in in. per min.

To find the cost of electrical energy in dollars per foot of bead multiply the kilowatt input to the motor-generator set by 12 times the cost of the electrical energy in dollars per kw-hr., and divide the product by 60 times the travel speed in in. per min.

To find the cost of labor in dollars per foot of bead divide 12 times the rate in dollars per hour by 60 times the travel speed in in. per min.

If hand welding instead of automatic welding were to be considered, the electrode consumption would be greater because 15 to 20 per cent of each length used is discarded. In automatic welding, this is eliminated by a continuous wire feed from a reel.

The usual hour rate for hand welders is within the range covered by the labor costs assumed above, but the welding speed of hand welders on a job to which automatic welding can successfully be applied is only $\frac{1}{2}$ to $\frac{1}{3}$ the speed of the latter.

Test, performance and manufacturing standards of electrical apparatus have been published by the National Electrical Manufacturers Association, 420 Lexington Avenue, New York, as the NEMA Handbook of Apparatus Standards, formerly known as the Electric Power Club Handbook of Apparatus Standards. The book embraces standards of electric power, control and measuring apparatus for the generation, distribution and utilization of electric energy.

Establishes Steel Foundry Laboratory

Large Company's Equipment for Research—High Frequency
Electric Melting Furnace, Testing and Heat-
Treating Equipment Available

FROM the standpoints of location, construction, equipment and personnel the new research laboratory of the American Steel Foundries serves well as an example of the growing tendency in American industry to search out, with the support of adequate laboratory facilities, methods and materials to satisfy the increasingly exacting demands of purchasers.

The laboratory is located at the East Chicago, Ind., plant of the company, in a building constructed during the war, when it served as a power plant for a forge shop, which has been dismantled. As the power house was located on the opposite side of the forge shop from the foundry units, the laboratory is now 300 yd. away from the nearest manufacturing building.

The framework of the laboratory building is of steel, and the walls are brick filled. The roof trusses are overlaid with cement tile, and the column and wall foundations are of concrete. Of special interest is the fact that the massive foundations, which formerly supported power machinery, are now being used most satisfactorily as testing machinery bases, affording a degree of rigidity which is often highly essential for work calling for a high degree of accuracy.

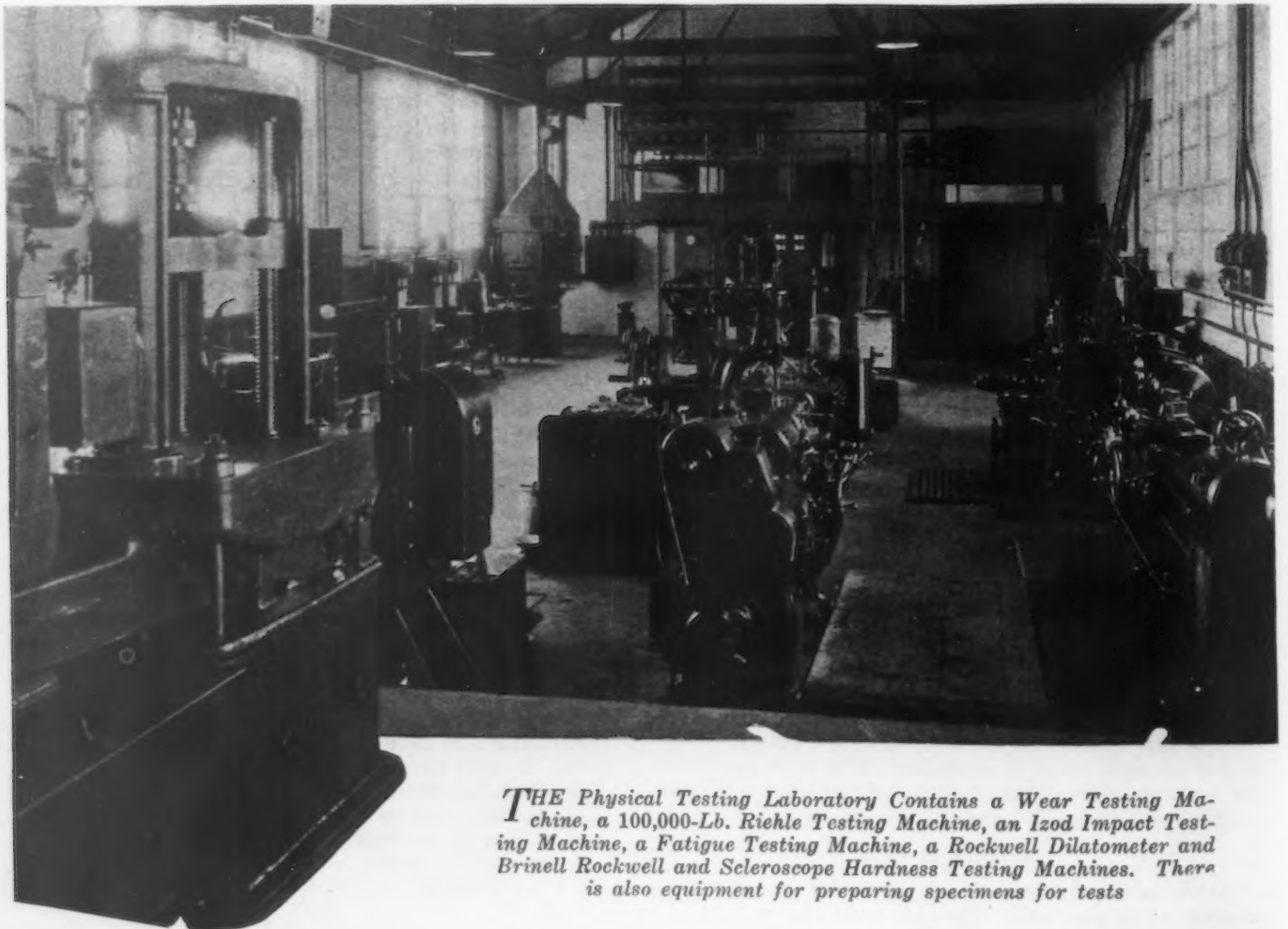
About one-half of the structure, which is 36 ft. wide by 320 ft. long, is now used for laboratory purposes. A 100 per

cent expansion in floor area is therefore possible without additional constructional expense.

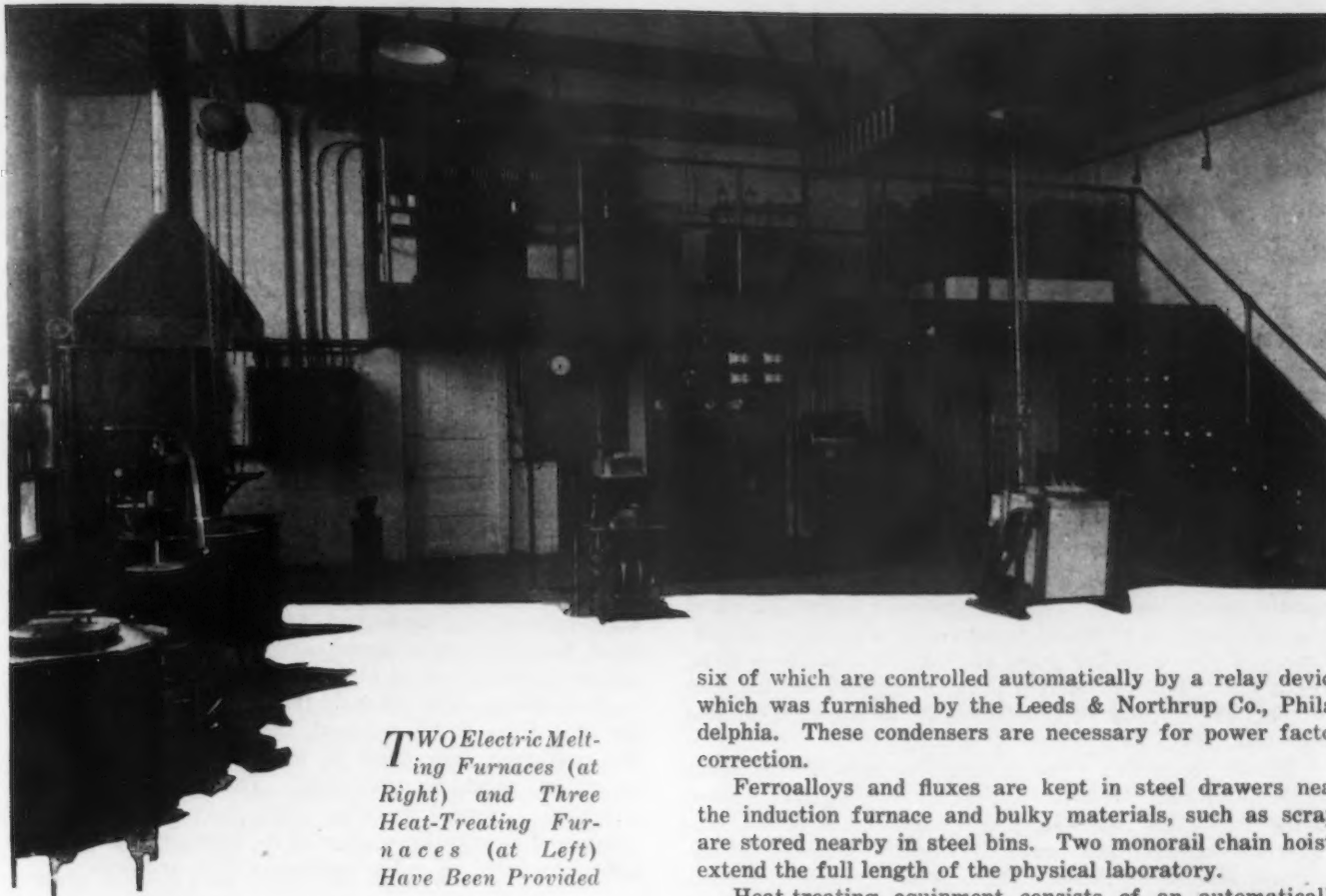
Photomicrographic equipment, which is located in a separate room, was furnished by E. Leitz, Inc., New York. It allows a magnification of 10,000 diameters. Ordinarily the work performed calls for a magnification of 100 to 1000 diameters, with an occasional magnification of 5000 diameters. This apparatus is equipped for photomicrographic work on specimens up to 8 in. square in actual size. The machine is equipped with shock absorbers, though there has been no occasion for their use on account of the massive foundation.

Adjacent to the microscopic room is a locker room and across the hall is a chemical laboratory. These departments, including offices and a library, occupy the north half of that portion of the building now in use. The remaining half is occupied by a workroom in which are located the melting units, the heat-treating units, the machine shop and the physical testing laboratory. In general the arrangement provides for the location of testing machines at the north end and along the east wall. Near the middle of the room and along the west wall is a well-equipped machine shop. At the south end of the room are located the melting furnaces and the heat-treating equipment.

Physical testing apparatus consists essentially of the fol-



THE Physical Testing Laboratory Contains a Wear Testing Machine, a 100,000-Lb. Riehle Testing Machine, an Izod Impact Testing Machine, a Fatigue Testing Machine, a Rockwell Dilatometer and Brinell Rockwell and Scleroscope Hardness Testing Machines. There is also equipment for preparing specimens for tests



TWO Electric Melting Furnaces (at Right) and Three Heat-Treating Furnaces (at Left) Have Been Provided

lowing machines: An Amster Frères wear testing machine is in continuous service. Instead of the load being applied with a spring, as originally designed for the machine, a floating load has been substituted in order to maintain a constant load as the specimens wear. An electric blower has been installed to keep the specimens from heating. The Riehle Brothers Testing Machine Co. furnished a 100,000-lb. testing machine and an impact testing machine of the Izod type. There is also an R. R. Moore fatigue testing machine, built by the Thompson Grinder Co., Springfield, Ohio. Fatigue tests are run at a speed of 1800 r.p.m. on specimens approximately $\frac{3}{10}$ in. in diameter at the center. Weights are added whereby a load of about 80,000 lb. per sq. in. may be applied.

Other equipment includes machines for preparing specimens for microscopic work and Brinell, Rockwell and scleroscope hardness testing apparatus. A dilatometer, which was furnished by the Stanley P. Rockwell Co., Hartford, Conn., is used to determine the expansion and contraction of specimens when subjected to heat and cold.

Machine tools are all driven by individual motors. They include a bench lathe, a 20-in. x 48-in. engine lathe, a 14-in. x 36-in. lathe, a metal band saw, a 16-in. shaper, a drilling machine and a grinder.

Special Melting Furnaces

Two melting furnaces have been provided, one of the carbon pile resistance type and the other an induction furnace. The latter was constructed by the Ajax Electrothermic Corporation, Trenton, N. J., with electrical supplementary equipment of General Electric manufacture. This induction furnace has a melting capacity of 100 lb. in 45 min., and heats of 150 lb. can be made. The furnace consists of a crucible which is surrounded by a water-cooled coil of flattened copper tubing wound on edge. This tubing is insulated from the crucible. Incoming current to the 60-kw. motor-generator set is three-phase, 60 cycles and 220 volts. Outgoing current is single-phase, 960 cycles and 900 volts. With this equipment are installed 18 condensers,

six of which are controlled automatically by a relay device which was furnished by the Leeds & Northrup Co., Philadelphia. These condensers are necessary for power factor correction.

Ferroalloys and fluxes are kept in steel drawers near the induction furnace and bulky materials, such as scrap, are stored nearby in steel bins. Two monorail chain hoists extend the full length of the physical laboratory.

Heat-treating equipment consists of an automatically controlled gas-fired furnace and two Leeds & Northrup Co. hump-type furnaces.

The basement of this building is used for the storage of surplus supplies and spare parts. The dark room, used for developing photographic plates, is also located there.

This research laboratory is equipped, therefore, for the production of experimental steels and alloys. Their heat treatment can be followed up under exacting conditions. After production and heat treatment, the properties of these alloys can be examined chemically, microscopically and physically.

Producing Large Die-Castings for Instrument Cases

For several years the Brown Instrument Co., Philadelphia, maker of indicating, recording and automatic control instruments, has almost entirely swung over to the use of aluminum die-castings for the instrument cases and cover bezels of practically all models of its instruments.

A number of the die-castings required presented difficulties. The aluminum cases now standard for continuous chart recorders, for example, are among the largest aluminum die-castings ever produced on a quantity basis. They are 15 in. high, 13 in. wide and no less than 7 in. deep.

Die-cast aluminum cases cost substantially more than cast iron cases, if the cost of the cases only is considered. There is, however, a perfection of detail assured by the process and flaws are comparatively rare. And their resistance to rusting and corrosion is a feature.

Precision work on the standard yard and inch is advocated by the American Institute of Weights and Measures, 115 Broadway, New York, so that material standard bars may be sent to London in 1932 for comparison with the imperial standard yard, at the decennial comparison then to be made.

Heat Treatment of Gray Iron

Strains May Be Relieved by Heating at Moderate Temperatures; Castings May Be Softened Without Weakening by Annealing Above the Critical

BY EDWARD E. MARBAKER, PH.D.*

WHILE considerable information exists on the heat treating of gray cast iron, it has been looked upon as a dangerous procedure, and until very recently the process was employed in very few foundries. One of the reasons for the slow progress in this field of investigation is the difficulty in obtaining satisfactory experimental results due to the fact that compared with steel, cast iron is a very complex alloy. However, notwithstanding the difficulty of the subject, a great deal of work has been done, and it has been established that the properties of gray iron castings can be profoundly affected by the use of a suitable heat treatment.

The object of this paper is to bring together the recent information with the hope that the interest of foundrymen, metallurgists and engineers may be aroused, and that further experimental and practical work will result in the improvement of cast iron. Much is being written of the effect of casting temperatures, methods of molding and rates of cooling, all of which are instrumental in producing gray cast iron of more uniform structure and superior physical properties. These variables come into play while the molten metal is cooling, while in heat treating the variables which must be controlled exist entirely in the solid state. One may be considered in a way as the reverse of the other, and it is certain that the physical laws which control the various steps in one process are equally effective in the other.

The student of the heat treatment of cast iron and its effects on the properties of the metal must be referred to the theories of the constitution of the iron-carbon alloys which are generally familiar to metallurgists. The assumption that cast iron is a steel of eutectoid composition, different from true steel in structure only because of the presence of graphite flakes, is generally followed. The basic theory which has been well substantiated in the case of steel can then be closely followed in working with cast iron, but the excess carbon is disregarded because the properties of the iron which it is desired to change by heat treatment are inherent in the constituents which are common both to steel and cast iron. The elements present in cast iron in much larger amount than in steel, such as silicon and manganese, exercise a profound influence on the properties of the metal; therefore only the fundamental ideas derived from the study of thermal effects on steel can be applied. Accordingly cast irons differing in composition require different heat treatments to bring about like effects. The time element in heat treating is as important as temperature, because the material is in the solid state and

molecular activity is necessarily reduced. Complete transformation is rarely obtained because the necessary extension of the time involves increased cost.

In actual heat treating operations two conditions may be brought about. In the first of these it is desirable only to remove strains which have been produced during the casting process, and this is carried out at relatively low temperatures. In the second case the cast iron is also softened and thus made more easily machinable. This procedure is carried out at higher temperatures.

In working out a schedule for heat treatment, especially for cast irons to be softened, the critical temperature of the particular iron (that is, the position of the thermal arrest A_c) should be determined. The changes in structure which it is desired to bring about take place above this point, and definite knowledge of its position eliminates the difficulties involved in the method of trial and error.

Removal of Strains in Castings

Practically no investigations on the heat treatment of cast iron were reported prior to 1915, although there had been many important contributions on the constitution of the iron-carbon alloys and on the growth of cast iron. While these investigations were not concerned with the practical results of heat treatment, they form the theoretical basis of subsequent work.

An anonymous author¹ reported in 1915 that the casting strains in small hardware parts can be relieved by heating for 8 hr. at dull redness (1100 deg. Fahr.), and then cooling very slowly, the time required being one day. These castings were softened also, "due to the precipitation of some of the combined carbon as graphite."

L. M. Sherwin² in 1917 investigated the problem quite carefully, using a series of irons of ordinary composition, except that the silicon content was low, and found that by heating at 1100 deg. Fahr. for 24 hr. and slowly cooling, the casting strains were removed and the hardness reduced slightly. The tensile strength was reduced about 5 per cent. It was also found that similar results were obtained by heating at 400 deg. Fahr. for 24 hr. and cooling slowly.

J. E. Hurst³ in 1919 studied the prolonged heat treatment of a series of commercial irons in the form of bars. The silicon content varied from 1.14 to 2.69 per cent. It was found that by heating at 1067 deg. Fahr. in a muffle furnace for periods of 72 and 150 hr. and cooling slowly, the hardness rapidly diminished with the time, and that the extent of the decomposition of the combined carbon depends upon the silicon content.

C. J. Wiltshire⁴ reported that in castings heated slowly to 700 deg. Fahr. and held at that temperature for 7 hr. and allowed to cool very slowly (20 hr. to 300 deg. Fahr.) the strains are completely eliminated.

J. T. Harper and R. S. MacPherran⁵ in 1923 found that casting strains are relieved by heating at 1150 deg. Fahr. for one hour. With longer heating the strength and hardness decrease materially.

In 1924, R. T. Rolfe⁶ made a very careful study of the following composition: total carbon 3.59, graphitic carbon 2.86, combined carbon 0.73, silicon 1.65, manganese 0.62,

*The Whiting Corporation's Industrial Fellowship, Mellon Institute of Industrial Research, Pittsburgh.

¹ *Foundry*, V. 43, p. 188 (1915).

² L. M. Sherwin, *Foundry*, V. 45, p. 435-8 (1917). *Transactions, Am. Foundrymen's Assn.*, V. 26, p. 509-26 (1917).

³ J. E. Hurst, *Engineering*, V. 108, p. 1-3 (1919).

⁴ C. J. Wiltshire, *Transactions, Am. Foundrymen's Assn.*, V. 28, p. 346-7 (1919).

⁵ J. T. Harper and R. S. MacPherran, *Foundry*, V. 51, p. 177-80 (1923). *Transactions, Am. Foundrymen's Assn.*, V. 30, p. 167 (1921).

⁶ R. T. Rolfe, *Metal Industry* (London), V. 24, p. 501-2, 525-6, 551-2 (1924).

sulphur 0.10, phosphorus 0.66. Bars were heated at various temperatures from 752 deg. Fahr. to 1832 deg. Fahr. for one hour and cooled slowly in hot sand. His conclusions were that casting strains can be removed successfully by heating at 1112 deg. Fahr. for one hour and cooling slowly. Tensile strength was reduced about 6.5 per cent and the hardness decreased 2.5 per cent.

J. W. Bolton,⁷ in the same year, found that strains can be removed by heating slowly to 700 to 1000 deg. Fahr. and cooling slowly in the furnace. He states that annealing to soften is practical only where strength requirements are low. He found, as did Rolfe, that annealing at 1350 deg. Fahr. weakened the casting greatly. In a later paper⁸ Bolton recommends a temperature of 700 to 800 deg. Fahr.

J. W. Donaldson⁹ carried out prolonged annealing tests at 842 deg. Fahr. and 1022 deg. Fahr. and found that the combined carbon content was decreased, with a corresponding lowering of strength and hardness. Decomposition of carbide increases with temperature or time.

F. Grotts¹⁰ in 1925 showed that the physical properties of cast iron can be radically modified by suitable heat treatment. His iron had total carbon 3.24, silicon 2.46, manganese 0.96, sulphur 0.15, phosphorus 0.514. The average transverse strength as cast was 3966 lb. and the Brinell hardness was 131. After heating at 700 deg. Fahr. and cooling slowly the transverse strength was 4366 lb. and the Brinell hardness 131. At higher temperatures the strength and hardness were much decreased. The conclusion was drawn that for removing strains quickly, it is good practice to anneal the castings at 600 deg. Fahr.; the strength and hardness are not then materially affected.

J. A. Capp¹¹ recommends that iron castings be heated from 932 to 1022 deg. Fahr. for from 4 to 10 hr., depending upon the section and weight.

In the following table is shown a recapitulation of the foregoing preheating schedules for the elimination of casting strains:

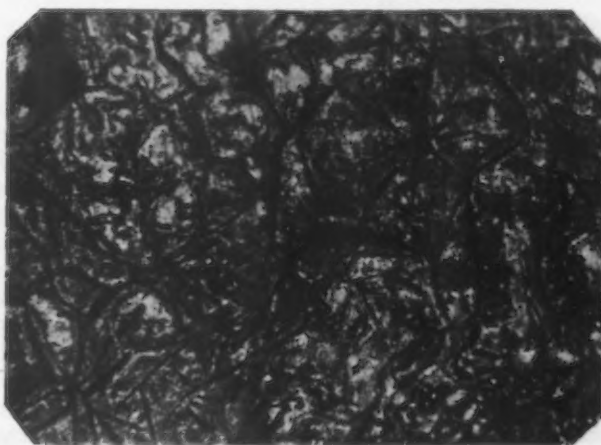
Author	Annealing Temperature, Deg. Fahr.	Time in Hours	Cooling Rate
Anonymous	1,100	8	slow (24 hr.)
Sherwin	1,100	24	slow
	400	24	slow
Hurst	1,067	72	slow
	1,067	750	slow
Wiltshire	700	7	slow
Harper and MacPherran	1,150	1	slow
Rolfe	1,100	1	slow
Bolton	700 to 1,000	..	slow
Donaldson	842 to 1,022	..	slow
Grotts	600	..	slow
Capp	932 to 1,022	4 to 10	slow
Bolton	700 to 800	..	slow

Some discrepancy exists, doubtless due to differences in analysis of the irons and the casting conditions. It is well known that the original structure has a profound influence on the success of heat treating and obviously the time may be diminished where the original structure is uniform. From these and other investigations (which will be cited later) it appears that the desired results may be obtained by heating at a high temperature for a short time or at a low temperature for a long time. This is borne out by the fact that in the "seasoning" of castings the strains are relieved at ordinary temperatures if a sufficient time is allowed. Some of the investigators unduly prolonged the time, and since the temperatures were well below the critical range (1350 deg. Fahr.) the properties of the castings were not materially changed. This is indicated by Sherwin's results, which were practically the same whether the bars were

heated at 1100 or 400 deg. Fahr. for 24 hr. Rolfe's results show that at 1100 deg. Fahr. such a long heat was unnecessary, for he accomplished in one hour all that Sherwin did in 24.

High-Temperature Annealing to Change the Structure

Cast iron may also be heat treated to make the structure more uniform, to reduce the hardness and to render it more easily machinable by reducing the combined carbon content. It is also possible to improve the strength and the resistance to impact. For such purposes the castings are heated to a temperature above the critical range—about 1350 deg. Fahr. for the commercial irons. This, it will be remembered, is the temperature at which steel containing 0.90 per cent carbon shows the all-pearlitic structure considered best for general purposes. By heating above the



Sand Cast Foundry Pig Iron. C = 3.2 to 3.5 Per Cent. X 100. Etch—5 per cent HNO₃ in alcohol. The structure is pearlitic with a small amount of cementite

critical temperature for a time depending upon the size of the casting, the structure changes to austenite; then when cooling slowly through the critical range the austenite changes to pearlite; subsequent rapid cooling traps the pearlitic structure, and thus a cast iron of superior quality is obtained.

In 1915 G. S. Evans¹² studied a series of ten commercial irons varying from light gray (almost all cementitic) to dark gray (pearlitic with excess graphite) and of Brinell hardness from 318 to 185. The silicon contents were high, varying from 2.70 to 3.81 per cent. The rate of transformation of the combined carbon into graphite was found to increase with temperature from 1300 deg. Fahr. to 1800 deg. Fahr. However, this reaction is so rapid at 1650 deg. Fahr. that in ordinary practice, where the combined carbon does not run over 0.50 per cent and with no appreciable chilling, it is simply necessary to heat to 1650 deg. Fahr. and cool immediately, either in the furnace or in the open air, to obtain the softening effect without materially affecting the strength. No change in composition or hardness was noted when annealing at 1250 deg. Fahr. or below. The change was slow at 1300 deg. Fahr., indicating that the critical range was between 1250 and 1300 deg. Fahr., the low range being due to the high silicon content. This is confirmed in malleable practice but not by the results of Potter's investigations noted later. Potter, however, worked with cast iron of lower silicon content. For instance, one of Evans' samples having the following composition: total carbon 3.28, graphitic carbon 2.70, combined carbon 0.58, silicon 2.98, manganese 0.32, sulphur 0.086, phosphorus 1.20, showed a Brinell hardness of 237 as cast. After heating at 1400 deg. Fahr. for 5 min. and cooling in the furnace to about 800 deg. Fahr. during a 3-hr. period, and then in air, this sample showed a hardness of 141, and

⁷ J. W. Bolton, *IRON AGE*, V. 114, p. 820-2 (1924).

⁸ J. W. Bolton, *IRON AGE*, V. 120, p. 611-2 (1927).

⁹ J. W. Donaldson, *Foundry Trade Journal*, V. 31, p. 517-22 (1925).

¹⁰ F. Grotts, *Transactions*, American Society for Steel Treating, V. 7, p. 735-42 (1925).

¹¹ J. A. Capp, *American Machinist*, V. 63, p. 385-7 (1925).

¹² G. S. Evans, *Foundry*, V. 43, p. 219-21 (1915).

the fracture was pearly. The combined carbon was completely changed to graphite.

Piwowsky¹³ in 1922 carried out annealing experiments at various temperatures and for different periods of time on a pearlitic cast iron having the following compositions: total carbon 3.18, graphitic carbon 2.49, combined carbon 0.69, silicon 2.95, manganese 0.63, sulphur 0.068, phosphorus 0.102. The A_c of this iron was 1490 to 1517 deg. Fahr. and the A_r was 1382 to 1337 deg. Fahr. When treated at temperatures below A_r , the rate of decomposition of the pearlite was not high enough for practical purposes. Between A_r and A_c , the rate is satisfactory when the silicon is sufficiently high. Rapid annealing is obtained by quickly heating to a temperature a little above A_c , and cooling through A_r , at a rate less than 1 deg. per minute.

At about the same time, Schüz¹⁴ explained very clearly the changes in structure which result during heat treatment. He claimed that satisfactory annealing results from heating at 1382 to 1472 deg. Fahr. from 3 to 10 hr., depending upon the size of the casting. He also shows that an iron of the following composition: total carbon 3.56, graphitic carbon 3.06, combined carbon 0.56, silicon 2.26, manganese 0.56, sulphur 0.112, phosphorus 0.38, and of Brinell hardness 160 to 164, when annealed for 24 hr., the carbide decomposition begins at 932 deg. Fahr. and is complete at 1112 deg. Fahr.; for a six-hour period the reaction begins at 1022 deg. Fahr. and is complete at 1202 deg. Fahr.; and for a three-hour anneal the decomposition begins at 1067 deg. Fahr. and is complete at 1202 deg. Fahr. "These results are surprising," says Schüz, "since the critical temperatures are much lower than is generally accepted." He explains this by the fact that relatively little of the original carbon is combined and the graphite tends to gather together the temper carbon produced by annealing. This investigation further substantiates the theory that annealing at a high temperature for a short time has an effect equivalent to annealing at low temperatures for a long time.

J. F. Harper and R. S. MacPherran¹⁵ state that annealing to improve the machinability should be done at 1450 to 1550 deg. Fahr., followed by cooling slowly. The decrease in hardness is accompanied by a loss in strength.

A process for heat treating white or gray cast iron was patented by A. K. Schaap (U. S. Patent 1,514,070, Nov. 4, 1924), for which great softness and undiminished strength are claimed. The process is carried out by heating to a temperature slightly above the critical (1600 deg. Fahr.) in a wrought iron muffle surrounded by a gas flame and open at the top. As soon as the iron reaches the proper temperature, the muffle and its contents are removed from the furnace and allowed to cool in the open air, the casting being protected from drafts. About 15 min. are required to cool to a black heat, after which it may be cooled in the open air. The entire operation, starting with cold iron, is said to require 45 min. The time must be increased when treating heavy castings.

The following results are quoted:

	Untreated	Treated
Total carbon	3.39%	3.30%
Graphitic carbon	2.73	3.19
Combined carbon .....	.66	.11
Silicon	2.36	2.50
Manganese .....	.37	.29
Sulphur .....	.064	.086
Phosphorus .....	.736	.746
Brinell hardness	240	140
Tensile strength, lb. per sq. in.	21,750	20,070
Transverse strength	2,900	2,770

¹³ E. Piwowsky, *Stahl und Eisen*, V. 42, p. 1481-3 (1922). Translated in *Forging and Heat Treating*, V. 9, p. 182-5 (1923).

¹⁴ E. Schüz, *Stahl und Eisen*, V. 42, p. 1484-8 (1922). Translated in *Forging and Heat Treating*, V. 9, p. 182-5 (1923).

¹⁵ J. F. Harper and R. S. MacPherran, *Foundry*, V. 51, p. 177-80 (1923).

¹⁶ F. Grotts, *Transactions*, American Society for Steel Treating, V. 7, p. 735-42 (1925).

¹⁷ H. B. Knowlton, *Transactions*, American Society for Steel Treating, V. 4, p. 494-506 (1923).

¹⁸ O. W. Potter, *Foundry*, V. 54, p. 633-7, 678-80, 775-8 (1926).

¹⁹ O. W. Potter, *Foundry*, V. 55, p. 427-31, 491-5 (1927).

²⁰ J. W. Bolton, *IRON AGE*, V. 120, p. 611-2 (1927).

F. Grotts¹⁶ investigated the heat treating of cast iron in 1925 with the idea that castings containing hard spots and therefore difficultly machinable need not be scrapped, for by heat treating the structure may be rendered uniform throughout. Working with a cast iron of the following composition: total carbon 3.24, silicon 2.46, manganese 0.96, sulphur 0.150, phosphorus 0.514, which had a transverse strength of 3970 lb. and a Brinell hardness of 131, he found that by heating to 1200 deg. Fahr. the hardness was reduced to 92 and the transverse to 3630 lb. By heating to 1400 deg. Fahr. (above the critical) the hardness was further reduced to 90 and the strength increased to 3790 lb. Thus he is justified in concluding that heat treatment can be used



Cast Iron Annealed at 1380 Deg. F. (750 Deg. C.) for 15 Min. and Furnace Cooled. X 100. Etch—5 per cent HNO_3 in alcohol. Structure shows cementite (white), pearlite (dark) and graphite (black)

to soften the iron without greatly weakening it. For certain classes of work he advises a heat treatment at 1750 deg. Fahr. for a short time, then machining, and finally heating, quenching and drawing to the desired hardness. This latter procedure is not unlike that of Knowlton,¹⁷ which is used primarily for hardening castings. In Knowlton's process, the casting is case-hardened by carburization, and is then reheated to 1700 deg. Fahr. for 3 hr., cooled to 1500 deg. Fahr. slowly, and then water quenched. It is claimed that some samples so treated were considerably stiffer than malleable castings and possessed a toughness comparable with that of case-hardened low carbon steel.

O. W. Potter¹⁸ finds the best combination of properties after heating at 1600 deg. Fahr. for 3 hr., cooling to black in 15 min. and then to room temperature in air. This is much like the Schaap process, the difference being that Potter held the metal at the annealing temperature for 3 hr. while Schaap proceeds to cool immediately after that temperature is reached. Potter obtained, as did Schaap, a uniformly soft casting with only a slight reduction in strength. In a more recent paper based on further experimental work, Potter¹⁹ restates his conclusions, but in his heat treating schedule the time for holding at the annealing temperature is reduced to 2 hr.

J. W. Bolton²⁰ summed the matter up very recently in a general way by stating (and in this he follows Piwowsky) that castings should be heated at a temperature somewhat above the critical temperature and then cooled slowly, at least in the temperature range between A_c and A_r . The time necessary is less the higher the temperature and the smaller the casting. Small castings can be completely an-

nealed in a few minutes at 1600 deg. Fahr. The metal becomes softer, more malleable, and weaker.

G. C. Priester and F. J. Curran²¹ worked with a number of cast irons of usual composition at temperatures from 1460 to 1650 deg. Fahr. for varying times. They sum up their work by advising the heating of the casting at a temperature above the critical and cooling slowly.

A table in which the results of the preceding investigations are recapitulated appears at right.

There is a much closer agreement among the schedules cited on the softening of cast iron to attain better machinability than with those for relieving strains. It will be noted that in general the theoretical considerations have been substantiated. The properties of cast iron can be improved in certain respects by heat treatment. The question arises as to whether iron castings of uniform structure and unstrained, even though the strength may be lower, are not superior from an engineering standpoint to ordinary untreated castings.

Conclusions

The best results in normalizing strained castings have been obtained by heating at temperatures considerably below the critical temperature for periods of time depending

²¹ G. C. Priester and F. J. Curran, *Transactions, American Society for Steel Treating*, V. 11, p. 741-58 (1927).

Author	Annealing Temperature, Deg. Fahr.	Time in Hours	Cooling
Evans	1,400		3 hr. to 800 deg. Fahr.
	1,650		3 hr. to 800 deg. Fahr.
Piowarski	1,500	5 min.	1 hr. through 1350 deg. Fahr. slow
Schüz	1,382 to 1,472	3 to 10 hr.	
Harper and MacPherran	1,450 to 1,550		slow
Schaap	1,600		slow to black heat
Potter	1,600	2-3	slow
Bolton	1,600	depends on size	slow
Priester and Curran	1,460 to 1,650		slow
Knowlton	1,700	3	slow to 1500 deg. Fahr. and water quench

upon the size and section of the castings, the object being to insure the heating of the castings throughout at the annealing temperature, and then cooling slowly.

In order to soften the casting and make it more easily machinable, it must be heated at a temperature above the critical point, held for a sufficient time to insure thorough heating, and then cooled slowly at least through the first 100 deg. Castings can be hardened again after machining, if desired, by reheating, quenching and drawing to the desired hardness.

Purchasing Department Eliminates Long Waits by Salesmen

BELIEVING that it might further improve its relations with the public by eliminating the long and annoying waits which salesmen are sometimes subjected to, the Oakland Motor Car Co., Pontiac, Mich., has adopted a new system, which in two months' operation has cut down the average waiting time for each caller to less than four minutes.

Charles O. Miller, supervisor of purchases, installed the system, which operates as follows:

When a salesman calls to see someone in the purchasing department, the clerk at the information desk records the time of his arrival and the time he had to wait before seeing the person he asked for.

The system has particular application to Mr. Miller's department. Under his supervision are nine buyers whose contacts are all with salesmen. Every morning Mr. Miller sends to every member of the department the record of the

preceding day, which shows the number of contacts each man made and the length of time he kept his callers waiting. A spirit of rivalry has grown up as a result, each man vying with the others to cut down the waiting-time average.

The best days record was an average wait of 1½ min., which the company considers remarkable in view of the fact that its callers in the purchasing department alone average from 100 to 200 a day.

Moreover, the man who has something to sell to the Oakland company is assured of a welcome, for when he enters the lobby of the building he finds a sign which is reproduced in the center column below.

Once in a buyer's office, the salesman sees another sign, signed by Mr. Miller, and here also reproduced.

A score card is posted in the lobby daily showing the previous day's record.

SALESMEN:
WE WILL TRY TO
SEE YOU PROMPTLY.

HELP US TO HELP YOU.

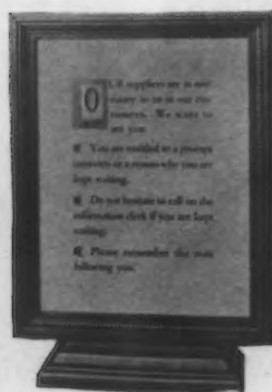
NUMBER OF SALESMAN
INTERVIEWED YESTERDAY
75

AVERAGE TIME OF WAITING
1.8 MIN.

SALESMEN INTERVIEWED IN
JUNE
2526

PURCH. DEPT.

These Signs in the Purchasing Department and Lobby of Oakland Motor Car Co.'s Plant Explain the Company's Aim to Interview Salesmen Promptly



It is our aim to have the Purchasing Department callers delayed as little as possible in seeking an interview. It is the duty of each buyer to see salesmen promptly.

It is also his duty to see that salesmen have the proper regard for other salesmen who may be waiting their turn.

I wish this policy to be something more than a framed notice on the lobby wall. It is up to each buyer to see that this is the case.

C. O. MILLER

Machines Large Structural Members

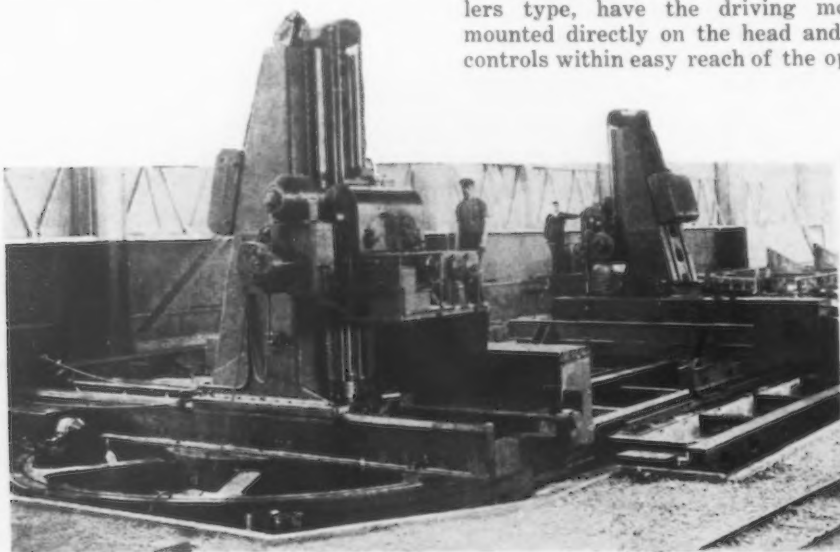
Special Equipment Consisting of Two Floor Boring, Drilling and Milling Units Used to Finish Ends of Columns and Other Sections

UNUSUAL accuracy and speed in finishing the abutting ends of large built-up structural members for tower and bridge sections are claimed

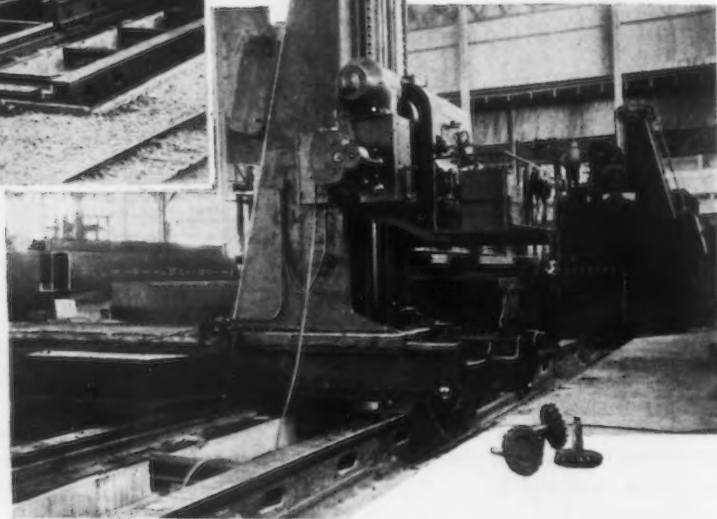
intermediate support is also provided in the form of a four-wheel truck to take care of any sag which might occur in the member being machined.

The milling units, of standard Sellers type, have the driving motor mounted directly on the head and all controls within easy reach of the oper-

ator when standing on the platform. The machines are also equipped with a wide range of boring and drilling speeds and feeds so that holes in the ends of the structural sections may be machined at the same setting of the work as for milling. Horizontal and vertical milling feeds are independent in direction and amount so that by combination the feed can be obtained in any direction. With this arrangement it is possible to turn corners or change direction without throwing out the milling feed, thereby eliminating interruption of the feed with its resultant mark in the work.



Special Equipment for Finishing Abutting Ends of Large Structural Members. The view above shows the general arrangement of the two units making up the machine, as well as of the longitudinal bed. The rotary unit, shown in the foreground, can be swiveled by power to an angle of 45 deg. in either direction. The intermediate work-support stands are located between the work tables of the machines, making up the complete equipment



for special floor boring, drilling and milling machines built recently by William Sellers & Co., Philadelphia, for the McClintic-Marshall Construction Co., Pottstown, Pa. The equipment was designed to mill the ends of columns and other sections 20 in. by 12 in. by 60 ft. long.

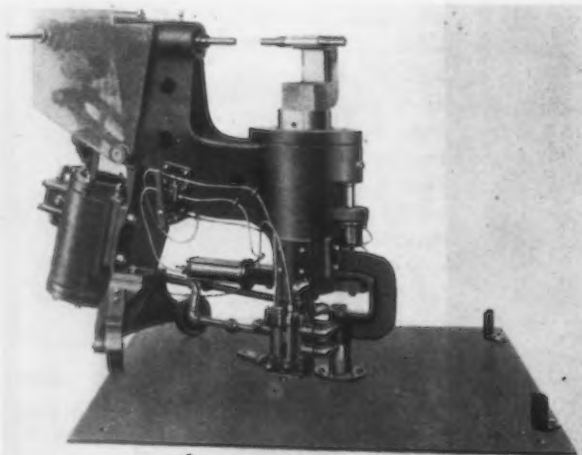
Arrangement of the machine may be noted from the illustrations. It is made up of two milling units mounted on a bed 80 ft. long, each unit consisting of a floor boring, drilling and milling machine. One unit is mounted on a rotary base at one end of the long bed and can be swiveled by power to an angle of 45 deg. in either direction so that the structural members may be finished on an angle as well as square. The second unit is mounted on a sub-base which may be adjusted longitudinally by power on the 80-ft. bed. This unit can be set to the required distance from the unit on the rotary base to finish both ends of sections, of any desired length up to maximum, at one setting. Each milling unit carries with it a slotted work-table for supporting and fastening the structural sections. An in-

Machine for Driving Web Rivets in Chassis Side Bars

THE Hanna Engineering Works, 1765 Elston Avenue, Chicago, has developed the riveter illustrated, which is particularly adapted for driving the web rivets in the side bars of automobile chassis frames.

In this machine the stake that supports the stationary die and that en-

ters the interior of the chassis frame is rotatable upon its vertical axis and is locked or indexed in two positions of rotation 180 deg. apart. The upper portion of the stake adjacent to the die mountings is offset or "goose necked." By indexing the stake the offset is thrown to the right or to the



The Combination of an Indexed Rotary Stake and Radially Rolling Base Permits the Machine to Drive a Diversity of Web Rivets. Pressure of 30 tons at 100-lb. air pressure is exerted at the dies

left as desired. An advantage of this arrangement is that the stationary die may be centered upon a rivet which joins a channel-shaped cross member to the side bar channel web, whether the flange legs at top and bottom of cross member extend toward the front or toward the rear of the chassis frame. The stake has double die mountings on one axis so that one die or the other is in position to oppose the live die regardless of stake indexing. This feature permits one riveter to enter upon rivets that would otherwise require two riveters.

The machine is mounted upon a radially rolling base which permits swinging it from the operating position on one side of a suspended chassis frame to the operating position on the other side of the frame. Trans-

verse and rotary movement are accomplished rapidly. It is claimed that because of the combination of an indexed rotary stake and radially rolling base one of these machines will drive as great a diversity of web rivets as four chassis frame riveters without these features. It is also stated that the machine is particularly adapted for truck and pleasure car frames of comparatively low daily production which require that each riveter drive a large number of distinct rivets in each frame.

The machine shown exerts 30 tons on the dies at 100 lb. air pressure and will drive rivets as large as $\frac{3}{4}$ in. in diameter hot and $\frac{7}{16}$ in. in diameter cold. It is also available in 20-ton and 15-ton capacities.

that stud. The ratchet shown contains 16 teeth and is operated by means of an indexing mechanism, including the rod *H* which extends into the machine. This rod carries a yoke on which a cam roll is mounted, and is operated by means of a cam on the main shaft of the machine.

Reciprocating motion is given to the rod through the cam roll. The rod is secured to the crank, mounted adjacent to the index ratchet, and thus oscillates that crank, causing the index pawl to engage the teeth of the ratchet. The lever secured in the pawl is intended for releasing the index ratchet in case the movement of the dial and the ratchet is impeded. In this event the dial can be turned in a direction opposite to the usual indexing motion and the obstructing piece can be removed.

Another detail view is an enlargement of the dial. This is machined so that the openings on the periphery fit the parts to be drilled and tapped. The openings are slightly oversize, to allow for variations in the castings or blanks. The relation of the holes drilled and tapped in these parts is controlled by a bushing carried by the arm *J* mounted on the sleeve, which slides on the stud and moves with the drilling spindles. The spring in contact with this arm tends to press the sleeve toward the dial and the work in it.

Fastened to the main body of the dial is the hardened plate *K*, with a

Horizontal Drilling and Tapping Machine

A NEW machine for drilling and tapping horizontally has been brought out by the Anderson Die Machine Co., Bridgeport. All the operating elements are similar to those in the company's standard No. 40 machine, except that the tapping spindles, as well as the drilling spindles and the axis of the dial, are in horizontal planes.

Where the hole to be drilled is of considerable depth and the material is stringy, the company's experience indicates that the horizontal machine is particularly well adapted. This is principally because the chips on such a design will drop free from the dial.

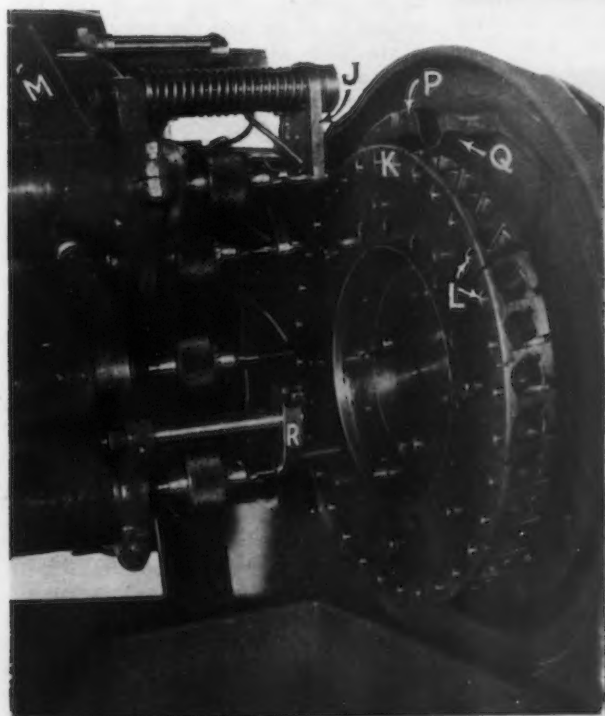
In the general view of the machine, which was taken from the end on which is located the segment operating the tapping spindles, *A* is the dial mounted in a housing, *B* is the segment operating the tapping spindles, and *C* shows the upper portion of the

spindle slide. The motor at *D* actuates the drilling spindles, while the main motor for operating the machine, as well as the tapping spindles, is located at *E*.

One detail shows the indexing mechanism, including the ratchet, the guard having been raised. In this view, *F* is the knee or slide on which the dial pan or housing is mounted. It carries the journal for the stud on which the dial operates. *G* is the index ratchet mounted on the end of



General Appearance of the Machine Is Supplemented by Two Details with Operating Units as Described in the Text



series of openings *LL* which fit the the lower end of the bushing on the arm *J*. The holes in the plate *K* correspond to the openings in the dial plate and are located to act as a jig.

As the spindle slide *M* approaches the dial and the work, the lower end of the bushing enters one of the openings *L* before the drill comes into contact with the work. This bushing exerts a pressure on the work so as to hold it more or less rigidly during the operation of drilling.

The particular dial illustrated has 32 openings. Hence, the index ratchet of 16 teeth presents two parts to be drilled and tapped for each stroke of the machine. On work of this nature the machine can operate at a speed of approximately 30 strokes a minute. This gives a theoretical production of 60 pieces a minute.

Parts, fed into the dial by hand, are generally malleable iron castings, subject to a certain variation in diameter or size. It sometimes happens

that a piece will not go into the dial to its proper depth. To prevent such defective parts being fed through to the drilling and tapping spindles, a rigid stop *P* is secured adjacent to the dial. This acts as a gage; if the part is not in position, it will lock the dial and prevent feeding. Preceding the stop is a spring *Q* which helps press a part into its proper place.

If a part thus impedes the rotation of the dial, the latter will be stopped in a position where the pilot pin *R* will prevent the drilling and tapping spindles from coming in contact with the dial. This prevents injury not only to the dial, but to the spindles. To clear the dial so as to permit further indexing, the lever projecting through the guard permits the operator to lift the index pawl out of the path of the index ratchet. This allows the dial to be rotated backward far enough so that the part which acted as an impediment may be removed.

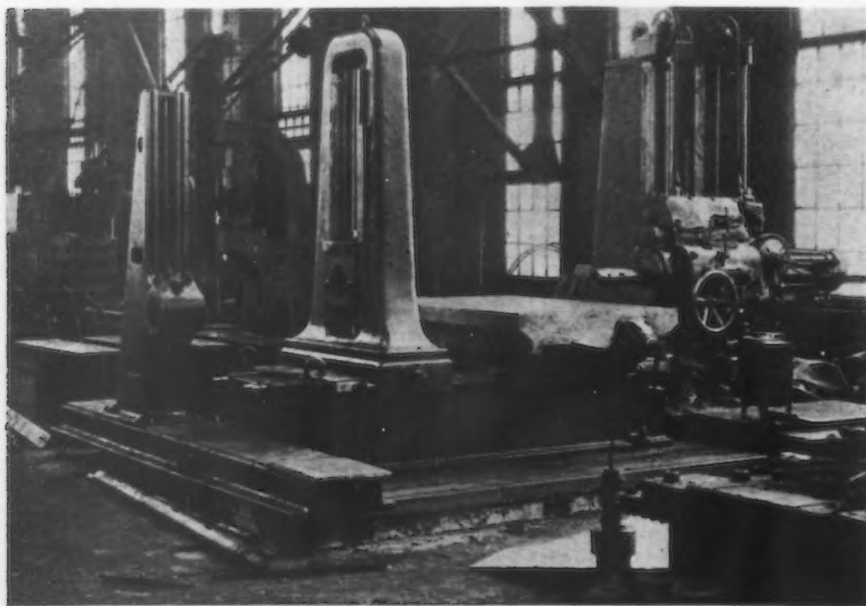
Combination Horizontal Boring, Drilling and Milling Machine

FOR use in structural and other metal-working shops, the work in which includes the machining of both small and large bulky pieces, Joseph T. Ryerson & Son, Inc., Sixteenth and Rockwell Streets, Chicago, is offering the combination floor and table type horizontal boring, drilling and milling machine here illustrated.

The machine shown was built for the Canadian Bridge Co., Walkersville, Ontario, Canada. It is a standard floor type horizontal boring and milling unit having a spindle saddle which is free to move vertically on the face of the column; a column with horizontal movement on its runway; a bed plate fastened to the runway; and an outer boring bar support which has hand movement on the bed plate parallel to the spindle travel. The

machine is arranged for direct motor drive and all speeds and feeds and power traverse to the spindle, spindle head and column are controlled from the head. The outer boring bar support, as well as the main post, is fitted with vernier and scales which read to 0.001 in.

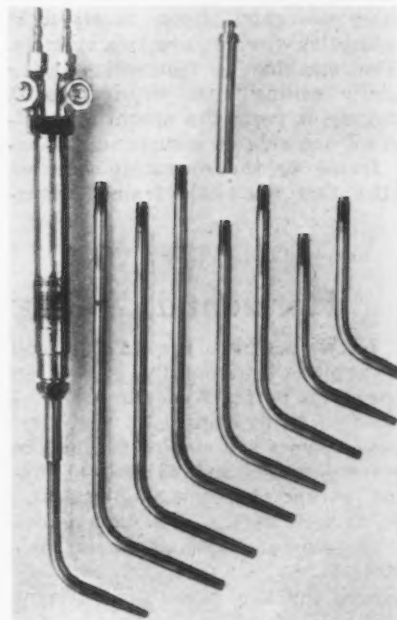
A special self-contained portable table, for use when machining small pieces, and which may be removed when the machine is wanted for larger work, is mounted on the bed plate. This table has movement in two directions, parallel with the spindle travel and parallel with the column travel. It is operated by hand, but the arrangement is such that an electric motor can be applied to provide table milling feeds and rapid traverse.



The Machine Combines Floor and Table Type Boring, Drilling and Milling Units. It was designed for use in machining both small and large pieces.

Blowpipe Weighs 14 Ounces

THE Air Reduction Sales Co. has placed into production blowpipes known as style 8800 and style 8900, the latter of which is illustrated. The tips are made of seamless copper tubing, tapered and bent to an angle of 67½ deg. Any one of these may be screwed into the mixer head, and this joint is so far from the heat of



Style 8900 Airco Welding Torch and Extra Tips

the flame that maintenance of a correct gas-tight joint is found to present no difficulty. Two mixing heads are provided, one for the smaller flames necessary for sheet metal, and the other to produce larger flames for steel plate.

Style 8800 is designed on similar lines, but is intended for general use where the heaviest sections may have to be welded. With No. 5 tip, the length is 17 in. and the weight 29 oz. Style 8900 with No. 1 tip is 14 in. long and weighs only 14 oz. The latter is equipped with light-weight hose and 3/16-in. connections.

Indianapolis Steel Treaters Elect Officers

A most successful year has been concluded by the Indianapolis Chapter, American Society for Steel Treating. At the annual frolic, held this year at Idelwood Park, the following officers for 1928-29 were elected:

Chairman: Edward J. P. Fisher, research metallurgist, Diamond Chain Mfg. Co.

Vice-Chairman: Carl J. Winkler, general superintendent, Schwitzer-Cummings Co.

Secretary: Nelson R. Gorsuch, industrial engineer, Citizens Gas Co.

Treasurer: Richard S. Smith, assistant director of research department, E. C. Atkins Co.

Foundrymen's 1929 Meeting in Chicago

Non-Operating, Limited Space Exhibition to Be Held in Hotel—Apprentice Contest Awards Announced

THE American Foundrymen's Association will hold its 1929 convention and exhibit at the Hotel Stevens, Chicago, the week of April 8. This was decided at a meeting of the board of directors held recently in Chicago. The exhibition hall of the Hotel Stevens will be utilized for exhibits and because of the limited space the size of booths will be restricted and there will be no exhibits in operation. Consideration was given to several plans, but there was unanimous adoption of the idea of limiting the scope of the exhibition next year. A larger exposition with operating exhibits will be held in 1930.

At its meeting the board of directors received the reports of judges of apprentice molding and pattern making contests and the awarding of certificates was authorized.

Winners of the pattern making contest were:

1. Frank F. Cuzzone, General Electric Co., Schenectady, N. Y.
2. Arnold H. Behrens, Milwaukee Pattern & Mfg. Co., Milwaukee.
3. John Albert Anderson, John Deere Harvester Works, East Moline, Ill.

Winners of the gray iron molding contest were:

1. Peter G. Bathgate, Brown & Sharpe Mfg. Co., Providence, R. I.
2. George A. Shuster, Jr., Olney Foundry Co., Philadelphia.
3. Attilio Rocchi, Cresson-Morris Co., Philadelphia.

Only one prize was awarded in the steel molding contest because the castings submitted from Milwaukee were lost in transit and the second and third prizes will be announced later. Alex. Cooke, General Electric Co., Schenectady, N. Y., was winner of the first prize.

A resolution was adopted by the board of directors that the American Foundrymen's Association petition the United States Government to include in its biennial census of manufactures statistics on the number of young men being trained in various industries by formal or indentured apprenticeship, together with the proportion which this number bears to the number of skilled mechanics in each industry. The resolution commented on the fact that the training of young men for the foundry industry and for industry in general is handicapped by such lack of information.

Research Policy

The board authorized the appointment of a committee of five representing various branches of the industry to determine policies of the American Foundrymen's Association regarding research work and appropriations for that purpose. It referred to a committee of three the report of the committee on gray iron castings which recommended a program of joint research in cast iron,

the American Foundrymen's Association to cooperate with the Engineering Foundation, the Gray Iron Institute and others.

Uniform cost systems adopted by the Steel Founders' Society of America and the Malleable Iron Research Institute were recommended to all steel and malleable foundries, and the board decided to encourage the Gray Iron Institute to develop a uniform cost system for gray iron foundries. The organization of a representative group of non-ferrous foundries to develop a uniform cost system was also recommended.

Action on Standards

The recommendations of the joint committee on molding sand research that two tentative procedures for testing sand be advanced to standard, that two new tentative procedures be established and that some minor changes be made in the wording of others to clarify the text were approved. The printing of a new pamphlet showing standard and tentative methods of tests for molding sand was authorized.

Covel-Hanchett Co. Buys Badger Tool Co.

The Covel-Hanchett Co., Big Rapids, Mich., has purchased the Badger Tool Co., Beloit, Wis., manufacturer of heavy-type disk grinding machines. All of the equipment of the Badger company at Beloit will be moved to Big Rapids, Mich., and the Badger line will be manufactured in the Hanchett plant at that place.

A few months ago the Covel-Hanchett Co. bought the Wilmarth & Morman Co. plant at Grand Rapids, Mich., and now, with the addition of the Badger line, it will manufacture an almost complete line of grinding machinery, excepting internal and roll grinding machinery.

Simplification for Woven Wire Fencing

The Division of Simplified Practice, United States Department of Commerce, announces that simplified practice recommendation No. 9 on woven wire fencing, which was recently revised by the industry, is in effect as of July 1, subject to annual revision. The original recommendation, as adopted by the industry, reduced the variety of woven wire fencing from 552 to 69, and woven wire fence packages from 2072 to 138. The revised recommendation further reduced this to 62 and 117, respectively.

The board also approved the tentative standard malleable foundry refractories' shapes and sizes adopted by the joint committee on foundry refractories and passed upon favorably by the Division of Simplified Practice, United States Department of Commerce. The board authorized the appointment of a committee to consider the advisability of sponsoring a joint committee to draft uniform trade customs for the castings industry.

Resolutions were adopted in appreciation of the work done for the association by the retiring president, Stuart Wells Utley, and by two retiring directors, Jesse L. Jones and Herbert S. Simpson. The new board of directors was organized with the new president, S. T. Johnston of the S. Obermayer Co., Chicago, in the chair. C. E. Hoyt was reelected secretary-treasurer and manager of exhibits and R. E. Kennedy was reelected technical secretary. S. W. Utley, A. B. Root, Jr., S. C. Vessy and A. E. Hageboeck, who are directors, were elected members of the executive committee to serve with the president, vice-president and executive secretary. The resignation of W. D. Goldsmith as a director was accepted, the vacancy being filled by the election of H. Cole Estep, Penton Publishing Co., Cleveland.

New Plant for Preparing Foundry Sand

George F. Pettinos, 1206 Locust Street, Philadelphia, has recently put into operation a new plant near Millville, N. J., for the screening and washing of molding and core sand. The product, which is to be known as "Foundry Flints," is being marketed with emphasis on the smooth roundness of the flints and the care with which they are prepared. With grain sizes which, it is stated, are properly proportioned, a given amount of oil will go much further in making cores than would be the case with sand of irregular shape.

Inland Steel Buys Additional Land

The Inland Steel Co., Chicago, has bought a tract of 128.6 acres adjoining the Indiana Harbor, Ind., plant of the Youngstown Sheet & Tube Co. The land is the last unoccupied section in the vicinity of the Indiana Harbor plant of the Inland Steel Co. and was bought to provide room for future development. There are no immediate plans for the improvement of the property. The land was bought from Princeton and Harvard universities and the Massachusetts Institute of Technology, joint beneficiaries in the will of the late Henry C. Frick, former owner. The consideration was \$543,000.

Business Analysis and Forecast

Favorable Trade Conditions Are Strong

Business Still Following Downward Path Predicted by
P-V Line—No Serious Recession Likely

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

THAT demand and supply conditions are temporarily in balance may be indicated by the fact that the P-V line remained unchanged last month. Accordingly, commodity prices also were little changed, though such trend as has appeared has been downward. Business on the whole receded in June and in early July, as is clearly reflected in volume of freight tonnage, imports and steel production. Nevertheless, stocks of manufactured commodities in producers' hands are rather large in a number of industries. Industry in general is very spotty. A number of leading companies in the more active industries have been able to do very well, and report better earnings for the second quarter, but narrow

margins of profit are hurting the rank and file in many lines and reports of severe competition and numerous failures show that the average condition is but fair.

On the whole, the favorable conditions, aside from money and credit, are strong, and preliminary estimates indicate that the crop prospects are reassuring, except in the case of spring wheat. With demand in the key industries (building, automobiles, steel) good and the leading companies in a very strong financial position, business prospects for the fall are fair. Probably a little further recession in business activity will occur, but it will not be much more than seasonal and is likely to be followed by a period of irregular stability.

The year-end prospects, however, continue uncertain.

THREE chief problems, or questions, bearing on the business outlook, are found in bank credit, crops and the position of certain backward industries. If developments in these respects are satisfactory, the business situation will continue good; otherwise a downward trend may be expected.

As to the position of bank credit and money, no material change has occurred recently. Bank reserve ratios are relatively low in comparison with those of recent years, the Federal Reserve ratio being about 69 per cent in comparison with 79 a year ago. Loans and discounts are high in com-

Factors in the General Business Outlook

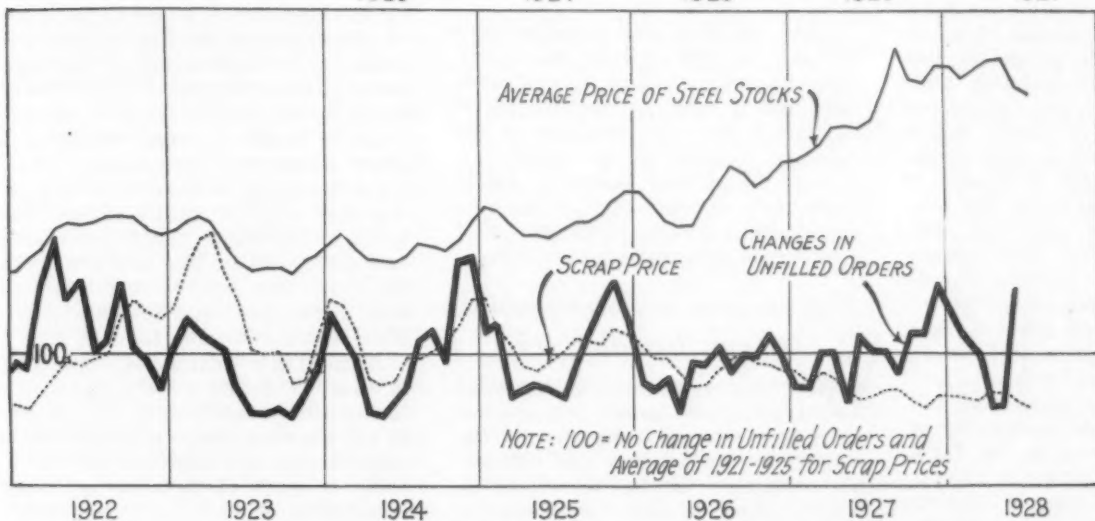
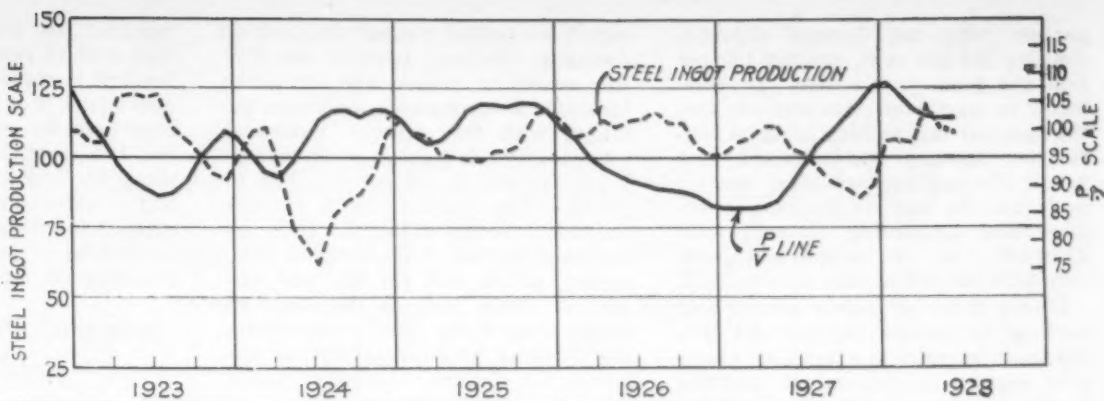
Favorable Factors

- (1) *Building activity continued its upward trend in June*
- (2) *Automobile production, though declining, is in large volume, considering the season*
- (3) *Retail trade volume is fairly large and continued to gain in June*
- (4) *Crop prospects good*
- (5) *Merchandise exports gained in June, considering the season*
- (6) *Unfilled steel orders increased*
- (7) *Strong financial position of most leading companies*
- (8) *Light mercantile inventories*

Unfavorable Factors

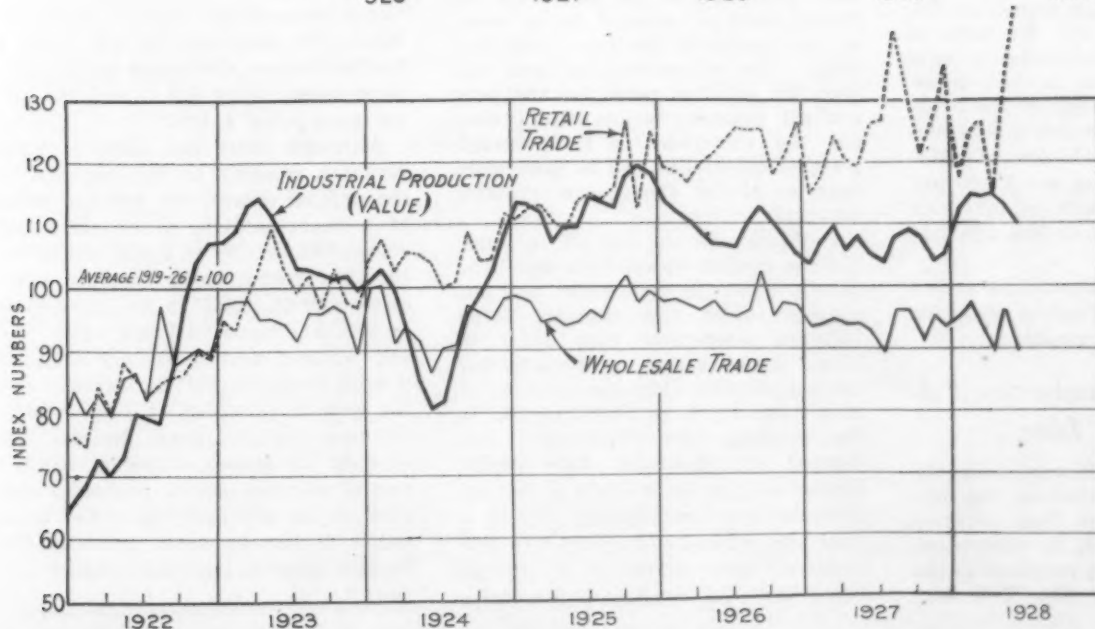
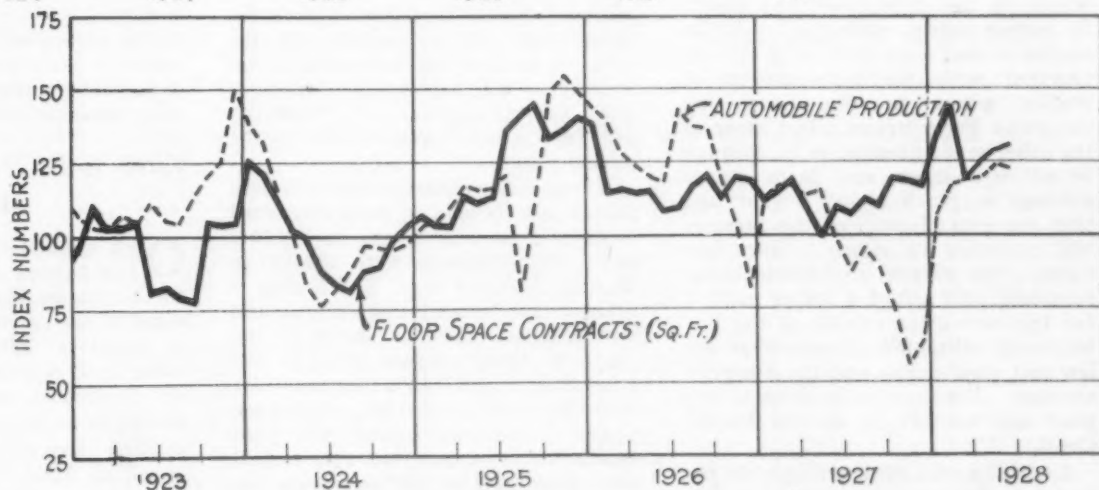
- (1) *Bank credit moderately strained and money rather tight*
- (2) *Declining commodity prices*
- (3) *Railroad freight traffic and revenue lower in June, with little improvement since then*
- (4) *A considerable number of industries are in an unfavorable position (textiles, rubber, paper, sugar, coal and pig iron; excess supply of crude and fuel oil)*
- (5) *Severe competition and narrow profit margins*
- (6) *Business failures numerous*
- (7) *Factory labor employment 4 per cent under a year ago*
- (8) *Political uncertainties*

DOWNWARD
Movement of the P-V Line (Ratio of Commodity Prices to Physical Volume of Trade) Has Stopped. Steel Production (adjusted) after rising for five months has moved downward for two months



UNFILLED
Orders Have Again Turned Upward; Stock Prices, Though at a High Level, Are Irregular and Scrap Prices Are Weak. The two latter indexes point to lower operating conditions

BOTH Building Activity and Automobile Output Showed Great Strength in June. They are higher than at the same season in any of the past five years



RETAIL Trade Continues to Show Improved Buying Sentiment. Wholesale business remains slow, while industrial production is well in line with retail sales

parison with net demand deposits, running 119 per cent, against 109 per cent last year at this time. Brokers' loans in particular are out of line, the figure at this writing being \$4,184,000,000, against \$3,141,000,000 last year. The member banks are heavily in debt at the Reserve Banks, bills rediscounted amounting to well over \$1,000,000,000, in comparison with only \$398,000,000 at this time in 1927.

Money rates are above normal and tending to become higher. All this has been brought to a head by heavy gold exports during recent months, though the present situation has been forced by an over-extension of credit for speculation in stocks and in real estate. No relief is probable until there has been a large amount of liquidation in brokers' loans, which will allow a reduction in bills rediscounted. This situation at present is unfavorable, not only as to the outlook for investment securities, but also for business since high money rates tend to check building operations and the purchase of equipment, to say nothing of their general effect on the cost of working capital and on financing of installment sales.

The crop outlook is fairly good, and is reassuring as to the probability of any trouble developing in the farm situation. Some unfavorable aspects appear in the wheat crop, as spring wheat in the Northwest has shown up rather poorly, while the large Canadian wheat crop that is promised, together with the accumulation of winter wheat in the Southwest, threatens lower prices. But most of the other crops promise to be average or above average, and farm prices average so much above a year ago that the gross income of the farmers will probably be larger. Hogs are higher, the excess production being remedied, and afford a better market for the corn crop, volume of the latter being estimated at somewhat below last year's crop and the five-year average. Fruit crops in general are good and notably so on the Pacific Coast.

As to the sore spots among the industries, they continue sore—textiles, coal, paper, rubber, oil. No signs of sustained material improvement have appeared. Conditions in such industries must act as a drag on the progress of all industries taken together. The troubles of these backward industries, however, are not acute, but are a rather chronic condition to which we have become more or less adjusted during recent years.

Clearly the most threatening aspect of the business situation is to be found in money and credit.

Declining Steel Production Follows P-V Line

IF we make due allowance for the usual seasonal variations, the output of steel ingots in June declined for the second month in succession. This appears to be in response to the preceding action of the P-V line,

which barometer reached its peak in January. In June, however, the P-V line ceased to decline and its action indicates a temporarily stabilized position, with the general industrial output about in balance with the nation's demand at the present level of prices. The further trend of this barometer seems doubtful. It is determined by the ratio between commodity prices and the physical volume of trade, and, as the trend of prices seems to be slightly downward, any increase in physical volume (allowing for seasonal variation) would bring renewed decline.

Until the P-V line actually turns upward, we will consider the underlying tendency both in general business and in steel production to be downward and any increase in the monthly indexes to be temporary. Present indications suggest a fairly stable rate of steel production, with any change probably in the nature of a moderate and gradual recession.

Construction and Automobile Output Rounding Off

DURING recent months the steel industry and industry in general have been strongly supported by the activity in the building and automobile industry. It is, therefore, of much interest to note the trends established by the final June figures for these two key industries, and the more so because the two usually run together. We are again impressed with the appearance of "rounding off" in the two curves shown in the second chart.

Automobile production in the United States and Canada in June amounted to 425,100 cars and trucks, or 16,500 a day. This compares with 460,000 in May, or 17,690 a day. The decline is greater than usual for the season and our adjusted index, as shown in the chart, is 122.2 against 123.6 in the preceding month (the average for 1921-1927 is equal to 100). The June figure is record-breaking for that month, but it represents a real decline from May, and on the seasonally adjusted basis is exceeded by as many as ten months in the years 1925 and 1926. The automobile business has seen its seasonal peak for the year and will probably decline steadily during the remainder of 1928, though whether the decline will be much more than usual for the season remains uncertain.

Building activity fell off in June, but the decline was a little less than usually occurs in that month, and our adjusted index rose slightly, being 130.6 in comparison with 128.7 in May. This increase in the adjusted index is smaller than the increase of May over April, so that the rise in the building production curve has tapered off. Moreover, July weekly figures appear to indicate a decided decrease and are running behind a year ago, when building activity was relatively low. It should be remembered that the increase in vacancies

reported, on the one hand, and the high cost of money, on the other, are tending to curtail speculative building operations in cities, which operations have been an important factor in the last few months. In a word, in June these key industries, while fully normal in activity and furnishing strong support for the steel industry, showed indications of passing their peak and rounding off for a decline.

Industrial Output and Trade Hold Up Well

THE situation revealed in the third chart, dealing with production and trade, is not unfavorable. The total value of the industrial output in June, based on the Federal Reserve Board's index of production and Bradstreet's price index, was considerably above the average for 1919-1926, though below the level of retail sales. The trend of industrial production values was downward in May and June, and we know that freight traffic fell off and commodity prices were lower. This is as forecast by the P-V line.

Retail trade reached a new peak in June, judged by old standards, but the continued addition of new stores to the growing mail order and chain organizations has deprived our old indexes of much of their value. Even department store sales taken alone, however, were higher with reference to the average for 1919-1926 than the curve of industrial production values. Wholesale trade decreased in June and continues relatively low.

Little to Be Hoped for in Stock Market

OUR unfilled steel orders barometer has turned sharply upward, due to the change from a condition of decline to one of increase. As noted in a previous review, circumstances make such a sharp rise unconvincing and judgment as to its significance should be suspended. Prices of heavy melting steel scrap at Pittsburgh declined in June, the average for the month being \$14.45 against \$15.25 in May. The July average will show a further decline, the figure for the first three weeks being \$14.08 and the latest price being \$14.25.

Although there has been a little response recently to the increase in the unfilled orders, the average price of a representative group of steel stocks fell sharply in June, the figure for that month being 150.5 in comparison with 160.7 in the preceding month, a drop of 6.3 per cent. At this writing steel stocks are showing a little strength, but the average for the first three weeks of July is only 148.1—a further small decline. In view of the money situation, no sustained recovery seems probable, and steel stocks are likely to suffer as a result of the apparent necessity for further general liquidation in securities.

June Continues Large Exports

Half-Year 20 Per Cent Ahead of 1927—Imports
Less in June, but Half-Year
Was 1½ Per Cent Up

WASHINGTON, July 27.—Maintaining their high rate, exports of iron and steel products from the United States in June aggregated 262,052 gross tons, which was only 5738 tons under the total of 267,890 tons exported in May, the largest monthly amount since February, 1921, when the volume was 393,328 tons. For the six months ended with June, exports amounted to 1,358,742 tons, or 225,315 tons over the total of 1,133,427 tons for the corresponding period of last year, an increase of a little less than 20 per cent. The reduction of 20 per cent in freight rates on iron and steel for exportation, effective Jan. 1, 1928, is assigned as one leading reason for the rising trend of exports. It is understood that this reduction, made "experimental" for one year, will be continued by the carriers, provided iron and steel exports

show an increase of 20 per cent, and that amount of gain has been almost reached so far this year.

Imports of iron and steel in June declined to 65,819 tons, a drop of 6287 tons under the 72,106 tons exported in May. For the six months ended with June, however, a slight increase, amounting to 6511 tons, was made over the corresponding period of last year, the respective totals being 389,895 tons and 383,384 tons.

Based on daily movement, exports in the 30 days of June were at a higher rate than in the 31 days of May, the June shipments averaging 8735 tons as against 8642 tons in May.

One of the important factors swelling the June shipments was scrap, exports of which amounted to 64,918 tons, against 59,417 tons in May, both being large quantities for this prod-

uct. Japan is said to be a controlling market in exports of scrap, and evidently is importing large quantities by reason of a shortage of pig iron. Exports to Japan, amounting to 18,551 tons, were greater than those to any other country in June. Canada ranked second, taking 13,797 tons. Italy took 12,622 tons; Poland and Danzig, 8990 tons, and Germany, 8713 tons. For the six months ended with June, exports of scrap totaled 250,455 tons, against 104,710 tons for the corresponding period of 1927.

Next to scrap, the largest item of exportation in June was tin plate, with a total of 22,276 tons, of which Canada took 5558 tons; Japan, 3195 tons; China, 2945 tons; Argentina, 2456 tons, and Mexico, 1179 tons. For the six months ended with June, exports of tin plate totaled 125,099 tons, against 152,767 tons for the first

Exports of Iron and Steel from the United States
(In Gross Tons)

	June		Six Months Ended June	
	1928	1927	1928	1927
Pig iron	5,674	4,863	25,329	22,539
Ferromanganese	338	75	4,861	293
Scrap	64,918	26,111	250,455	104,710
<i>Pig iron, ferroalloys and scrap</i>	<i>70,930</i>	<i>31,049</i>	<i>280,645</i>	<i>127,542</i>
Ingots, blooms, billets, sheet bar, skelp.....	5,198	12,096	56,930	39,335
Wire rods	4,818	1,625	18,479	8,612
<i>Semi-finished steel</i>	<i>10,016</i>	<i>13,721</i>	<i>75,409</i>	<i>47,947</i>
Steel bars	13,816	6,874	70,768	56,576
Alloy steel bars.....	1,276	732	7,492	3,029
Iron bars	158	487	1,818	2,516
Plates, iron and steel.....	14,529	10,126	71,726	70,352
Sheets, galvanized	10,420	14,108	75,076	85,955
Sheets, black steel.....	19,223	12,136	90,311	90,229
Sheets, black iron.....	1,612	1,656	7,488	8,895
Hoops, bands, strip steel..	4,820	4,567	27,697	25,371
Tin plate; terne plate....	22,276	18,543	125,099	152,767
Structural shapes, plain material	19,356	11,744	89,873	66,222
Structural material, fabricated	11,476	6,324	42,294	33,165
Steel rails	12,483	11,601	109,586	97,917
Rail fastenings, switches, frogs, etc.	1,998	3,178	27,574	18,152
Boiler tubes, welded pipe and fittings	22,886	20,412	121,113	147,889
Plain wire	4,660	2,740	23,701	15,903
Barbed wire and woven wire fencing	7,000	5,004	38,427	23,249
Wire cloth and screening..	169	171	846	1,130
Wire rope	430	407	2,578	2,406
Wire nails	1,300	581	8,607	3,572
Other nails and tacks.....	1,091	744	5,265	3,999
Horseshoes	26	45	205	247
Bolts, nuts, rivets and washers, except track	1,281	969	6,500	5,753
<i>Rolled and finished steel</i>	<i>172,286</i>	<i>133,649</i>	<i>954,044</i>	<i>915,294</i>
Cast iron pipe and fittings	3,101	2,315	17,362	13,120
Car wheels and axles.....	1,702	947	7,624	9,605
Iron castings	754	568	6,386	5,799
Steel castings	812	911	5,240	4,187
Forgings	1,184	338	4,861	2,729
<i>Castings and forgings..</i>	<i>7,553</i>	<i>5,079</i>	<i>41,473</i>	<i>35,440</i>
All other	1,267	1,149	7,171	7,204
Total	262,052	184,647	1,358,742	1,133,427

Imports of Iron and Steel into the United States
(In Gross Tons)

	June		Six Months Ended June	
	1928	1927	1928	1927
Pig iron	11,799	13,497	75,295	60,319
Ferromanganese*	5,870	1,636	24,405	12,428
Ferrosilicon†	747	263	2,092	5,663
Ferrochrome‡	76	...	338	382
Scrap	7,715	5,992	22,841	33,922
<i>Pig iron, ferroalloys and scrap</i>	<i>26,207</i>	<i>21,388</i>	<i>124,971</i>	<i>112,714</i>
Steel ingots, blooms, billets and slabs	2,054	1,037	11,866	6,545
Iron blooms, slabs, etc....	...	...	4	...
Wire rods	1,119	597	9,417	6,599
<i>Semi-finished steel</i>	<i>3,173</i>	<i>1,634</i>	<i>21,287</i>	<i>13,144</i>
Rails and splice bars.....	3,282	3,238	9,646	10,114
Structural shapes	14,438	12,563	88,686	75,336
Boiler and other plates...	2,215	285	3,157	2,540
Sheets and saw plates....	2,110	1,395	14,839	7,423
Steel bars	5,742	9,209	50,312	50,825
Bar iron	418	264	1,350	2,382
Hoops, bands and cotton ties	1,224	2,433	10,530	14,692
Tubular products (wrot.)..	2,773	7,583	21,055	32,492
Nails, tacks, staples.....	688	703	3,843	3,174
Tin plate	42	42	592	892
Bolts, nuts, rivets and washers	17	40	143	137
Round iron and steel wire	344	426	2,022	2,351
Barbed wire	183	284	1,749	2,846
Flat wire; strip steel....	103	215	153	1,421
Steel telegraph and telephone wire	25	3	1,162	30
Wire rope and strand.....	184	259	803	1,363
Other wire	1	26	278	255
<i>Rolled and finished steel</i>	<i>33,789</i>	<i>38,968</i>	<i>210,320</i>	<i>208,273</i>
Cast iron pipe.....	2,525	6,886	31,517	47,545
Castings and forgings....	125	141	1,800	1,708
Total	65,819	69,017	389,895	383,384
Manganese ore*	12,650	36,851	83,917	236,603
Iron ore	188,892	231,815	1,268,412	2,636,923
Magnesite (dead burned)..	7,825	3,471	27,474	49,587

*Manganese content only.

†Silicon content only.

‡Chromium content only.

half of 1927. Of the six months' total for the present year, Japan took 26,683 tons, against 29,998 tons, while Canada took 23,387 tons, compared with 24,950 tons for the corresponding period of last year. Tin plate exports in May were 22,462 tons.

Exports of plain structural material in June totaled 19,356 tons, of which Canada took 17,377 tons. For the six months ended with June, exports of this material aggregated 89,873 tons, against 66,222 tons during the corresponding period last year. In May, exports of structural material were 18,498 tons. For the first half of the current year Canada took 75,492 tons, against 53,905 tons for the first six months of 1927.

Black steel sheets to the quantity of 19,223 tons were exported in June, of which 9767 tons went to Canada and 7207 tons went to Japan. For the first six months of 1928, exports of black sheets amounted to 90,311 tons, against 90,229 tons for the corresponding period of last year. Canada was the destination of 40,500 tons of this product during the first half of the present year, against 39,223 tons for the corresponding period of last year. Exports to Japan were 37,430 tons and 37,551 tons, respectively.

Of the 14,529 tons of plates exported in June, 12,202 tons went to Canada. For the first six months exports of plates were 71,726 tons, of which Canada took 60,584 tons. For the corresponding period of last year this class of exports totaled 70,352 tons, of which Canada took 55,991 tons.

Exports of boiler tubes and welded pipe in June totaled 21,281 tons, of which 9456 tons was casing and oil line pipe, 6905 tons was black welded pipe, and 3519 tons was galvanized pipe. These shipments were distributed to markets all over the world where there are oil operations.

Of the casing and oil exports in June, 2804 tons went to Venezuela, 1422 tons to Argentina, 672 tons to Canada, 630 tons to Mexico and 524 tons to Rumania. Japan took 1749 tons of black welded pipe; Canada, 898 tons; the United Kingdom, 673

tons, and Argentina, 479 tons. Galvanized pipe exports were distributed in small lots, the Dominican Republic taking the largest single quantity, amounting to 487 tons.

North and Central America and the West Indies took 124,397 tons of the June exports and 650,589 tons during the first half of the current year, against 558,960 tons for the corresponding period of last year. Canada and Newfoundland alone took 100,855 tons in June and 535,178 tons during the first six months of 1928, against 433,264 tons during the corresponding period of 1927. South America took 35,452 tons in June and 219,525 tons during the first six months of the present year, against 186,714 tons during the first six months of last year, Argentina leading.

Europe took 41,928 tons in June and 149,734 tons during the first half, against 90,664 tons during the corresponding period of last year. The Far East took 58,731 tons in June and 330,989 tons during the first six months, against 286,613 tons during the first six months of 1927. Japan took 40,387 tons in June, 181,572 tons during the first six months of the present year and 148,402 tons during the first six months of last year, and was (next to Canada) the largest consumer of steel products from the United States during all three periods.

The decrease in imports in June was due largely to the drop in incoming shipments of cast iron pipe when compared with May, the totals being

2525 tons and 9150 tons, respectively. Of the June imports of cast iron pipe, 1798 tons came from France and 450 tons from Germany. Pig iron imports rose to 11,799 tons in June, against 9732 tons in May. For the first six months they were 75,295 tons, against 60,319 tons for the corresponding period of last year. Of the June imports, 6726 tons came from the United Kingdom; for the first six months, imports from that country were 34,727 tons. British India supplied 3792 tons in June and 23,780 tons during the six months' period.

Of the 14,438 tons of structural shapes imported in June, 7287 tons came from Belgium, 4363 tons from France and 2585 tons from Germany. Of the 5742 tons of steel bars imported in June, 2574 tons came from Belgium, 1355 tons from Sweden and 1081 tons from France. Ferromanganese imports in June amounted to 5870 tons, of which 3256 tons came from Canada, 1357 tons from the United Kingdom and 1127 tons from Norway.

Soviet Russia supplied 4120 tons of the 12,650 tons of manganese ore concentrates imported in June, while 3131 tons came from Brazil, 3009 tons came from India and 2282 tons from British West Africa.

Belgium, with 13,555 tons, was the largest source of imports in June. The United Kingdom ranked second, with 11,623 tons, while Canada was third, with 10,524 tons. Germany and France supplied 9705 tons and 9150 tons, respectively.

Shrinkage in Imports of Iron Ore

IMPORTS of iron ore into the United States in June are reported by the Department of Commerce at 188,892 gross tons, compared with 211,270 tons in May. The June imports are the smallest since March and compare with 231,815 tons a year ago. For the first half-year the total was 1,268,413 tons, a reduction of about 1 per cent from last year's 1,280,756 tons.

Chile, with more than half the total, maintained its lead as a source of supply. French Africa in the six months has taken second place, which was held by Cuba last year. There was a gain of about 10 per cent in receipts from French Africa and a reduction of nearly 64,000 tons in the Cuban ore. Sweden sent 70,000 tons less than a year ago, no ore coming

from that country during June. On the other hand, Canada gained about 37,500 tons in the first half year, compared with 1927.

Details of the June shipments and of those of the first half year are shown in the table.

Meeting of American Manganese Producers

The annual meeting of the American Manganese Producers' Association will be held at the Mayflower Hotel, Washington, Sept. 10 and 11. A review of the progress of domestic manganese developments in the past year and prospects for the future will be presented. All persons interested in the development of American manganese are expected to be present. J. Carson Adkerson is president of the association.

Imports of Iron and Steel Products into the United States in June

From	Gross Tons
Austria	12
Belgium	13,555
Czechoslovakia	51
France	9,150
Germany	9,705
Hungary	141
Italy	115
Netherlands	950
Norway	1,460
Spain	196
Sweden	2,988
Switzerland	2
United Kingdom	11,623
Europe	49,948
Canada	10,524
Mexico	44
Cuba	3
Dominican Republic	806
Ecuador	700
America	12,077
British India	3,792
China	1
Japan	1
Total	65,819

SOURCES OF AMERICAN IMPORTS OF IRON ORE

	(In Gross Tons)			
	June		Six Months Ended June	
	1928	1927	1928	1927
Canada	303	970	42,726	5,179
Cuba	25,500	22,000	179,286	243,000
Chile	90,800	132,900	715,500	687,900
Spain	6,653	.....	11,903	3,919
Sweden .....	.....	22,776	19,614	89,120
French Africa	47,350	44,241	241,371	219,031
Other Countries	18,286	8,928	58,013	32,607
Total	188,892	231,815	1,268,413	1,280,756

Little Activity in European Markets

British Bank More Furnaces—Production in Germany Is Less and Orders Fall Off—France Pushes Internal Business

(By Cable)

LONDON, ENGLAND, July 30.

NORTH-EAST COAST producers have banked three additional blast furnaces, of which two were making hematite, leaving only 29 North-East Coast furnaces, including seven on hematite, now active. The industry, generally, is depressed, though export demand is improving slightly.

Foreign ore markets are idle. The Swedish strike has entered its seventh month without any sign of terminating.

Finished steel markets, generally, are quiet. Scottish plants are reopening this week, but there is no large accumulation of orders. There is some business to be had because of a stiffer tendency in Continental steel. But export sales are negligible, except in certain specialties.

Tin plate demand is improving. There is good export inquiry for mod-

erate lines, and Welsh makers hope to obtain enough business so that the industry may work generally at over 90 per cent of capacity. The forward position is being maintained, but some makers are anxious to dispose of August tin plate orders accepted at below 18s. basis, IC, f.o.b. works port.

Galvanized sheet markets are quiet, with an easier tendency. Black sheets are dull, but rollers of Japanese thin sheets are well placed for several weeks ahead.

On the Continent of Europe

Continental steel markets are strong. Germany is reported well sold on direct export orders. Syndicate prices are advancing, sheet bars being quoted up to £5 (\$24.30) a metric ton. Demand from Britain is quiet, owing to the holiday periods.

French production of pig iron in June was 844,000 metric tons; of raw steel, 797,000 tons.

products. While French and Saar district furnaces are selling increasing quantities of pig iron to consumers in South Germany, reports of large tonnages of British iron sold to this district are said to be somewhat exaggerated.

June output of pig iron totaled 1,021,350 metric tons, compared with 1,044,046 tons in May and 1,067,583 tons in June, 1927. Total production of pig iron in the first half of the year was 6,586,380 metric tons, slightly larger than the first half of 1927 with 6,365,057 tons.

The report of the Vereinigte Stahlwerke A. G., Dusseldorf, for the second quarter of this year, which is the third quarter of the company's business year, shows a decline in production and total sales, but an increase in exports. Pig iron output declined to 1,541,871 tons compared with 1,703,105 tons in the first quarter of the year, and steel ingot production to 1,619,150 metric tons compared with 1,842,187 tons in the first quarter. During the quarter the number of employees was reduced from 182,014 to 177,000. The decline in output of pig iron by 10.5 per cent and of steel by about 14 per cent is explained in the report as seasonal. During the quarter the company blew out one furnace and blew in a new furnace at its August Thyssen Huette at Hamborn. Unfilled tonnage at the end of the second quarter was 89.4 per cent of the unfilled tonnage at the

German Output Decreases

Unfilled Tonnage of United Steel Works Smaller—Prices Continue Unchanged

BERLIN, GERMANY, July 14.—The industrial outlook has not improved and no increase in demand for iron and steel seems to be expected for the rest of this year. The total of unemployed is declining, but the reduc-

tion in the number has been much smaller than during the first half of last year. The Pig Iron Syndicate is selling iron for August delivery at unchanged prices and no change has been made in domestic prices of steel

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.86 per £ as follows:

	£0 17½s.	to £0 17¼s.	\$4.25	to \$4.31
Durham coke, del'd.....	1 2½		5.48	
Bilbao Rubio ore.....	3 8½	to 3 9½	16.64	to 16.89
Cleveland No. 1 fdy.....	3 6		16.04	
Cleveland No. 3 fdy.....	3 5		15.80	
Cleveland No. 4 fdy.....	3 4½		15.68	
Cleveland No. 4 forge...	3 5		15.80	
Cleveland basic (nom.)...	3 8	to 3 9	16.53	to 16.77
East Coast mixed.....	3 10½		17.13	
East Coast hematite....	7 15	to 8 5	37.66	to 40.10
Rails, 60 lb. and up....	6 0	to 6 15	29.16	to 32.81
Billets	13 15		66.83	
Ferromanganese	13 0	to 13 5	63.18	to 64.39
Ferromanganese (export)				
Sheet and tin plate bars,				
Welsh	6 0		29.16	
Tin plate, base box.....	0 18	to 0 18½	4.37	to 4.43
Black sheets, Japanese				
specifications	13 7½		65.00	
Ship plates	7 12½	to 8 2½	1.63	to 1.74
Boiler plates	9 0	to 10 10	1.92	to 2.25
Tees	8 2½	to 8 12½	1.74	to 1.84
Channels	7 7½	to 7 17½	1.58	to 1.69
Beams	7 2½	to 7 12½	1.53	to 1.63
Round bars, ¾ to 3 in..	7 5	to 7 15	1.55	to 1.66
Steel hoops	9 0	to 10 0	1.92	to 2.14
Black sheets, 24 gage...	9 15	to 10 0	2.09	to 2.14
Galv. sheets, 24 gage...	13 7½		2.86	
Cold rolled steel strip, 20				
gage, nom.	16 0		3.42	

*Ex-ship, Tees, nominal.

Continental Prices All F.O.B. Channel Ports

(Per Metric Ton)

	£3	3s.	to £3	5s.	\$15.32	to \$15.80
Foundry pig iron (a):						
Belgium	3 3	to 3 5			15.32	to 15.80
France	3 3	to 3 5			15.32	to 15.80
Luxembourg	3 3	to 3 5			15.32	to 15.80
Basic pig iron (nom.):						
Belgium	3 1	to 3 2			14.82	to 15.07
France	3 1	to 3 2			14.82	to 15.07
Luxembourg	3 1	to 3 2			14.82	to 15.07
Coke	0 18				4.37	
Billets:						
Belgium	4 15½				23.21	
France	4 15½				23.21	
Merchant bars:						
Belgium	5 16				1.28	
France	5 16				1.28	
Luxembourg	5 16				1.28	
Jolts (beams):						
Belgium	4 18				1.08	
France	4 18				1.08	
Luxembourg	4 18				1.08	
Angles:						
Belgium	5 10	to 5 12½			1.21	to 1.24
¾-in. plate:						
Belgium (a)	6 12				1.45	
Germany (a)	6 12				1.45	
¾-in. ship plate:						
Belgium	6 8				1.41	
Luxembourg	6 8				1.41	
Sheets, heavy:						
Belgium	6 1				1.33	
Germany	6 1				1.33	

(a) Nominal.

beginning of the business year last October, whereas, at the beginning of this year, unfilled tonnage was 92.3 per cent of the total Oct. 1.

There has been no improvement in the engineering industries, but the monthly report of the Machine Manufacturers' Association states that business as a whole has not shown any further decline. Business in locomotives and textile machinery is quiet. Demand for agricultural machinery has increased as usual at this season and conditions in paper making and printing machinery are reported to be satisfactory.

There are renewed reports of a

merger of three large bridge construction companies, Harkort Bruck-enbau, Flender & Co. and Hein Lehmann & Co. Machine-tool tobacco machinery and textile machinery manufacturers and builders of motors, dredges and cranes are reported to have taken orders to the value of about 40,000,000 m. from the Jugoslavian Government, to be partly paid for on reparations account. It is reported from Amsterdam that all cars on Dutch railroads are to be fitted with Kunze-Knorr brakes by the end of 1929. All German railroad cars will be equipped with these brakes within the same time limit.

French Mills Seek Domestic Orders

Prices Offer More Profit Than Export—Sellers Booked for Five to Six Months

PARIS, FRANCE, July 16.—Some sizable contracts will probably be placed soon in connection with the planned improvement of ports, the second part of the naval program, railroad rolling stock requirements, electrification of railroads and the Loucheur plan for construction of low rent dwellings. A part of these orders, however, will be placed in Germany to reparations account and French industries have exhibited some uneasiness. Minister of Labor Loucheur, however, has stated that in the project for construction of low cost dwellings the portion awarded to Ger-

many on reparations account shall not exceed 20 to 25 per cent of the entire expenditure and that the price paid shall in no case exceed the price at which similar materials could be obtained in France.

Stabilization of the franc has had a favorable influence on the price situation, but export prices have shown further advances. Some increase in domestic prices is expected to result, more in finished material than in other forms, as finishing mills are in many cases quoting prices that have not been advanced with their costs. As a means to improve these prices, efforts are being made to form

"ententes," the latest of which was among the nail manufacturers.

Export prices have registered an advance of about 1s. (24c.) per ton, f.o.b. Antwerp in the past week. Merchant bars have been increased from £5 12s. (1.34c. per lb.) to £5 13s. per ton (1.35c. per lb.). Ordinary specifications of beams have been advanced from £4 16s. 3d. (1.06c. per lb.) a week ago to £4 17s. per ton (1.07c. per lb.). Plates are unchanged at £6 6s. 3d. per ton (1.21c. per lb.), f.o.b. Antwerp for ¼-in.

The efforts made recently by French pig iron producers to form a selling organization have not yet succeeded and formation is not now expected before October. French foundry consumers of hematite iron have protested against any action by the Government on the recent request of the French hematite iron producers that a reduction should be made in the quantities of foreign hematite temporarily admitted free of duties.

Domestic prices of steel continue firm and most mills have booked orders for the next five to six months. At the present price level, mills find a satisfactory margin of profit, which is leading them to seek further domestic orders rather than to compete for export business. This situation is aiding in bringing export prices to a higher level. The strike of dock workers at Antwerp and Rouen caused some temporary delays in shipments abroad, as it confined French shippers to the port of Dunkirk, but this strike has ended and normal conditions again prevail.

Japanese Market Shows Improvement

Prices Well Maintained Despite Imports—Domestic Tin Plate Output Increases

The report of A. Cameron & Co., Kobe, Japan, on Japanese business conditions in June is rather optimistic. It is pointed out that the yen has become fairly stable at about 46½c., which is considered low, as trade returns are rapidly improving and the yen should be at about 47½c. The low rate of the yen is attributed in part to the abnormal conditions in the money market, where call rates have steadily declined until the banks are filled with funds and soon may be compelled to lower their interest rates on deposits.

Black sheets have been in active demand, total arrivals during May being 16,541 tons, more than double the total of April. Of these, 9729 tons came from Great Britain, 4899 tons from the United States, 1396 tons from Germany, 314 tons from Belgium, 5 tons from Sweden and 198 tons from other countries. The large receipts of black sheets in May were something of a surprise, although it is known that small trial orders have been placed by the galvanizers with Belgian, Swedish and other foreign mills. Prices early in the month

were fairly firm, but the large arrivals brought about an easier tendency despite improvement in demand from consumers. At the end of June the market prices on black sheets were 72.50 sen (32.63c.) per sheet for British material; 74.50 sen (33.53c.) per sheet for American and 71.50 sen (32.18c.) per sheet for Kawasaki Dockyard Co. sheets.

With Japanese mills devoting more attention to the manufacture of ordinary sizes of tin plate (14 x 20 in.), some decline in the importation of foreign material seems to be expected. To replace this, an increase in demand for tin plate scrap is developing. The Government Works is steadily increasing its production and unless foreign makers find it possible to meet this competition, in a few years Japan may be importing but very little tin plate. At the end of June American tin plate was selling in this market at 12.20 yen (\$5.52) per 100 lb. base box, British tin plate at 11.80 yen (\$5.34) per base box and domestic tin plate from the Government Works at Yawata at 11.25 yen (\$5.09) per base box.

During June there was a sudden increase in activity in steel bars, speculators being active in the belief that local strikes of stevedores would obstruct the importation of the raw materials for the Government Works and that stocks would be considerably depleted. The strikes, however, were of short duration, with the result that speculators were left with material on their hands. Demand is good and the Government Works has advanced its quotations for future deliveries by 4 yen (\$1.81) per ton. At the end of June steel bars were quoted by the domestic interest at 96 yen (\$43.24) per ton with foreign material at 98 yen (\$44.35) per ton; domestic angles 95 yen (\$42.99) per ton and foreign 100 yen (\$45.25) per ton; domestic beams 89 yen (\$40.27) per ton and foreign 97 yen (\$43.89).

German Company Builds American Aircraft Motors

HAMBURG, GERMANY, July 14.—The Bayrische Motorenwerke, which recently bought the rights for Germany of the American patents covering the "Wasp" and "Hornet" type aircraft motors, is now offering these motors in Germany. Many parts of these motors are being built of "electron," which is said to reduce their weight by as much as 38 per cent.

American Mills More Active for Export

Reported Competing for Japanese Structural Orders—Foreign Steel Marking Considered Here

NEW YORK, July 31.—Export business continues small, but in the past few weeks, it is pointed out by exporters to South American markets and the Far East that American mills seem to be exhibiting more interest in foreign orders than for some time. While there is less evidence of severe competition among mills in the United States, they are reported to be willing to quote prices calculated to secure orders, particularly on bars and shapes.

On tin plate business with Japan, American makers have been rather successful in securing recent orders, but in competing with Welsh mills in South America, as occurred a few weeks ago for a small tonnage of tin plate, they have not been able to submit the lowest bids. About 5200 base boxes of oil can tin plate for the Tokuyama Fuel and Arsenal Department of the Japanese Government have been awarded to a Japanese export house in New York. The provision department of the Japanese Army is expected to open bids about the end of August on about 20,000 base boxes of canners tin plate.

While there is a fair volume of small lot business coming to this country from Japan, orders for light gage black sheets for such large users as galvanizing plants, are small and are expected to continue rather limited for a time as a result of the present boycott of Japanese goods by the Chinese. The political situation that has developed from the divergent views of the Japanese and new Chinese Nationalist Governments over Manchuria, is reported to have resulted in a refusal of many Chinese to handle or use either Japanese products or foreign products handled by Japanese traders. While this might appear to be a condition that would react to the advantage of American exporters and mills, who could transact business direct with the Chinese buyers, it is pointed out that the Japanese trading companies usually handle the credits and financing of sales of American material to China.

Imported Steel Quiet

Importers in New York report a good volume of inquiry for steel bars, structural material, hoops and bands, but not much business has developed as yet. Steel prices continue substantially unchanged at 1.78c. to 1.80c. per lb., base, on plain steel bars, delivered New York, and about 1.68c. per lb. on beams, delivered New York. Consumers have recently shown an interest in wire and wire nails, but no business of consequence is reported to have been closed.

Recently importers of foreign steel have received notifications from the United States Treasury Department that at the protest of a large inde-

pendent steel company their arrivals of foreign bars, shapes and similar material were being investigated for markings of country of origin. For

the past five years or more it has been the practice to bring in such heavy steel material without marks showing the country in which it was manufactured and this is based by the importers on Treasury Decision No. 10,600 made in 1923. Under this decision, it is not necessary to have foreign steel such as plates, shapes, bars and similar heavy material marked.

Youngstown-Ohio River Link Approved

Report to Interstate Commerce Commission Recommends Construction of Branch Line—Decision Not Final

WASHINGTON, July 31.—Construction of two branch lines by the Pittsburgh, Lisbon & Western Railroad, which would afford the Youngstown district direct connection with the Ohio River, was recommended in a proposed report to the Interstate Commerce Commission made public last Friday. The report was prepared by C. V. Burnside, assistant director Bureau of Finance of the commission. He also recommended that the Montour Railroad be granted authority to acquire control of the Lisbon by purchase of its capital stock. The request of the Lisbon for permission to retain the excess earnings from the new construction, the assistant director held, should be denied. Both the Montour and the Lisbon railroads are controlled by the Pittsburgh Coal Co.

The recommendations of the assistant director are victories not only for the applicants, but also for iron and steel interests in the Youngstown and surrounding territory, who strongly intervened on behalf of the application for construction of new lines of the Lisbon. They insisted that connection of the Youngstown district with the Ohio River was necessary if the Youngstown district is to compete successfully with the Pittsburgh district steel industry. It was declared that, by reason of rail and water service through the Monongahela, Allegheny and Ohio rivers, the Pittsburgh district enjoys lower assembling costs on inbound raw materials, as well as on outbound finished products to the South and Southwest, than does the Youngstown district, which now has no water service.

Youngstown District Handicapped

The Youngstown district, it was claimed, has been suffering greatly from these handicaps and as a result has yielded second place as a steel center to the Chicago district. It was contended that, with river connection for the transportation of coal from the Pittsburgh and Connellsville district to the Youngstown district and of steel products from that district to the markets of the South and Southwest, rates would be lower than at present and the district placed on a more nearly even competitive basis with the Pittsburgh district.

Representatives of the Youngstown Sheet & Tube Co., the Republic Iron & Steel Co., and the Sharon Steel Hoop Co., as well as the city of Youngstown, appeared as witnesses at the hearing on the application of the Lisbon and strongly supported testimony given by the applicants.

Trunk Lines Oppose New Road

Opposition to the applications was vigorously expressed by trunk line carriers serving the Pittsburgh district, including the Pennsylvania, Baltimore & Ohio and Pittsburgh & Lake Erie railroads. In substance, they insisted that the new lines are not necessary and that the service desired by the Youngstown district can be made available through hook-ups with the Pennsylvania and Pittsburgh & Lake Erie lines.

To this the intervening steel interests responded that they had for a long number of years endeavored to have the trunk lines make such a connection, but without success. The trunk line carriers also insisted that estimates as to the cost of the new construction were too small. The assistant director, however, said that engineers of the trunk line carriers had based their estimate of \$8,600,000 for the new branches, without equipment, on the basis of construction like that of the trunk line carriers, whereas it is proposed to follow costs of construction of the line of the Montour. The applicant's estimate was about \$3,500,000 less than that of the trunk line engineers' estimate and would average about \$206,000 per mile.

The next step in the proceeding probably will be the filing by the defendant interveners of exceptions to the assistant director's findings, followed by arguments by the commission previous to its decision.

On July 1, American shipyards were building, or were under contract to build, for private shipowners, 396 steel vessels of 225,740 gross register tons, compared with 413 steel vessels of 223,147 gross tons on June 1, according to the Bureau of Navigation, Department of Commerce.

Scrap Dealers Form an Institute

Organization Patterned After Such Associations in Other Lines Will Work for Improved Trade Conditions

THE Institute of Scrap Iron and Steel has been organized by the members of the Eastern Scrap Iron Association and will function along lines similar to those adopted by such organizations as the American Iron and Steel Institute and the Copper and Brass Research Association.

Aims of the new organization include the elimination of unfair and unprofitable business practices, the elimination of waste and the raising of the business to a more dignified and profitable level. The adoption of a code of ethics is a part of the immediate program.

In commenting on the relations between scrap dealers and consumers, Benjamin Schwartz, Baltimore lawyer, who was recently appointed director general of the scrap institute, said:

"I have heard some talk of arbitrary rejections by the mills. It occurs to me that the mills, too, may have their complaints against the scrap iron business. They should welcome an association of this kind, with a centralized responsibility to which they can turn for the dissemination of information, the correction of evils and complaints, and for cooperative effort in the interest and for the benefit of the entire steel industry."

The new institute purposes to function along the following lines:

The fostering of good will with the trade itself and promoting better understanding with consumers and producers.

Standardization of specifications so far as is practicable. A campaign of education is to be carried on among the members in an effort to eliminate the causes of rejections by the mills, due to lack of information.

Gathering of information and statistics concerning conditions in the industry and discussion of these facts at regular periods, with the aim of substituting knowledge for guesswork.

Adoption of a code of business ethics for the elimination of unfair, undesirable or unprofitable trade practices.

Study and standardization of trade customs, including uniform contracts, terms, deliveries, etc.

Arbitration of disputes through a properly constituted commission.

Establishment of a traffic bureau for the information of the dealer and adjustment of his transportation problems.

Organization of a credit service.

One of the things to which the institute will give attention is that of cost accounting in the scrap business. It is stated that few dealers know accurately the costs of handling scrap.

Eleven chapters will be organized, one each in the following cities: New York, Newark, Jersey City, Buffalo, Syracuse, Boston, Hartford, Philadelphia, Reading, Baltimore and Pittsburgh. David Strauss of the Continental Iron & Steel Co., New York, as chairman of the committee on membership, is supervising the organization of these chapters.

Officers of the Eastern Scrap Iron

Association, which has organized the institute, are as follows: President, Joseph G. Hitner, Henry A. Hitner's Sons Co., Philadelphia; vice-presidents, J. V. S. Bishop, Bishop & Co., Philadelphia; David Strauss, Continental Iron & Steel Co., New York; Ben Cohen, Louis Cohen & Son, Wilkes-Barre, Pa.; Stanton L. Dreifus, S. Snyder Corporation, Rochester, N. Y.; David Pollock, of firm of Mayer Pollock, Pottstown, Pa.; secretary,

Foundrymen of Central Illinois Organize

The Central Illinois Foundrymen's Club was organized at a meeting held at Springfield, Ill., on July 2. Officers elected are: President, H. R. Hire, Hire Foundry Co., Peoria; vice-president, M. W. Baker, Illinois Foundry Co., Springfield; treasurer, Franklin Whitehead, Meadows Mfg. Co., Bloomington. The club is composed of gray iron foundries in the central Illinois district.

Carbon Furnace to Be Scrapped

The plant of the Carbon Furnace Co., Ltd., Parryville, Pa., has been sold to Harry Orkin of Slatington, Pa., and the stack will be dismantled. The furnace, which is one of the oldest in eastern Pennsylvania, was built in 1869 and rebuilt in 1898. It has an annual capacity of 40,000 tons, but had not been operated since 1923.

Heavier Pig Iron Imports in June

IMPORTS of pig iron in June are reported by the Department of Commerce at 11,799 gross tons, compared with 9732 tons in May. Both figures are far below the April total of 20,845 tons. The June figure may be compared with 13,497 tons received in June, 1927. For the half year there has been a gain of about 15,000 tons, compared with last year.

Receipts of pig iron from Great Britain were practically three times

Herman Moskowitz, M. Samuel & Son, Inc., New York; treasurer, Thomas F. Kelly, Brooklyn.

Members of the executive committee are: Max Meltzer, Hausman & Wimmer Co., Pittsburgh; Allen R. Hoffer, Allen R. Hoffer Co., Philadelphia; Morris Shapiro, Boston Iron & Metal Co., Baltimore; Howard L. Warner, Frank Samuel & Co., Philadelphia; Max Fechheimer, Fechheimer Iron & Steel Co., Allentown, Pa.; Sam Jacob, Jacob Brothers, Bridgeport, Conn.; M. Bonomo, L. Schiavone & Bonomo Brothers, Inc., Jersey City, N. J.; A. Lipman, New York Scrap Iron & Steel Co., New York; Abraham Isaac, Elizabeth, N. J.

as heavy in the first half of 1928 as a year earlier. An increase of 23,000 tons from that source was partly offset by a reduction of more than 7700 tons in shipments from Germany, which country has almost disappeared as a supplier of pig iron to the United States market. British India holds the position second to Great Britain for the six months, the two countries accounting for considerably more than 75 per cent of the total imports. The Netherlands stands in third place. Details of the June receipts and of those of the first six months, for 1928 and 1927, are given in the table.

Alabama City Furnace Being Rebuilt

The Gulf States Steel Co., Birmingham, is dismantling its blast furnace at Alabama City, Ala., and will rebuild stack along improved lines incorporating Dovel features. Also coal handling equipment will be added. Dwight P. Robinson & Co., Inc., New York, is the engineer in charge and the Reeves Brothers Co., Alliance, Ohio, is fabricating the steel hull.

At a meeting of the trustees of the Massachusetts Gas Companies in Boston last week no mention was made in regard to the purchase of the properties by the Koppers Co., Pittsburgh. President Richards of the Boston companies will, it is expected, make some sort of an announcement before long regarding the status of negotiations with the Koppers Co.

UNITED STATES IMPORTS OF PIG IRON BY COUNTRIES OF SHIPMENT
(In Gross Tons)

	June		Six Months Ended June	
	1928	1927	1928	1927
United Kingdom....	6,726	4,995	34,727	11,893
British India.....	3,792	5,667	23,780	22,792
Germany	55	750	95	7,811
Netherlands	894	1,840	13,515	16,020
Canada .....	...	19	378	689
France .....	...	23	...	23
Belgium .....	...	...	202	300
Norway	50	...	91	...
All Others.....	282	203	2,507	791
Total	11,799	13,497	75,295	60,319

This Issue in Brief

Production costs cut sharply by elaborate network of mechanical conveying systems. Electric refrigerator manufacturer uses 44 different conveying units, which have made possible a permanent decrease in the amount of man power, at the same time providing steady movement of materials in whatever quantities are called for by production schedules.—Page 265.

* * *

Removing strains from gray iron castings is best done by heating at temperatures considerably below the critical temperature for periods of time depending upon the size and section of the castings. The object is to heat the casting throughout at the annealing temperature, and then to cool slowly.—Page 285.

* * *

American machinery is increasingly popular abroad. During first half of 1928 foreign customers bought close to 240 million dollars worth of our machines, a gain of 13 per cent over total for same period of 1927.—Page 332.

* * *

Purchasing agents vie with each other to reduce salesmen's lost time. Automobile manufacturer keeps a record of the time each salesman is kept waiting and provides each buyer with a daily report, as a means of encouraging buyers to save salesmen's time.—Page 285.

* * *

Export steel business shows healthy gain. Rolled steel exports for June were 29 per cent above same month of last year. Shipments for first half of 1928 totaled 954,044 gross tons, a gain of more than 4 per cent over same period of 1927. Rolled steel imports increased about 1 per cent.—Page 293.

For best results in automatic welding, use a rapidly melting electrode, says welding machine manufacturer. Electrode which will do the required job at the highest speed should be selected, he says. This depends not only on the melting rate of the electrode, but also on the electrode diameter and welding current.—Page 277.

* * *

Blowing ore and fuel into blast furnace proves unsuccessful. The process lowers the temperature, and therefore is economical only when the furnace is working with a great excess of temperature.—Page 276.

* * *

Youngstown steel producers score a point in fight to get rail link between Youngstown and Ohio River. Commerce Commission examiner submits favorable report to commission, but trunk line railroads will object. If link is built it will give Youngstown producers the benefit of low-cost water transportation, and will enable them to compete for Southern and Southwestern business.—Page 297.

* * *

Standard tote pan is adopted for carrying small parts on conveying system. Holders, fitting snugly into the tote pans, are provided for each kind of part used in refrigerator plant. Workmen remove the holders, but not the pans themselves, from the conveyor.—Page 270.

* * *

Steel casting manufacturer's laboratory is equipped for steel making. In addition to the usual equipment for determining physical properties of specimens, laboratory in Midwest plant has special melting furnaces, to manufacture experimental steels and alloys.—Page 281.

Avoid long arc in automatic welding, says welding manufacturer, for it usually results in a poor weld. With a short arc there is a greater heat concentration, he says. The longer the arc the more opportunity there is for absorption of oxygen and nitrogen by the weld metal.—Page 277.

* * *

Carbon deposition near blast furnace top is not due to coke. Tests indicate that blast furnace gases are accountable.—Page 271.

* * *

Rolling mill capacity has increased sharply in past five years. The gain is about 21 per cent. Pittsburgh district leads with 27 per cent of the total capacity and Chicago district is next, with about 19½ per cent.—Page 272.

* * *

Will it be cheaper to weld by hand or to weld automatically? To answer this question, calculate the cost per running foot. That can be done by following the formula given on page 279.

* * *

Annealing gray iron castings to improve machinability should be done at 1450 to 1550 deg. Fahr., followed by slow cooling. However, the decrease in hardness is accompanied by loss in strength.—Page 284.

* * *

Decline of 3.8 per cent in July daily pig iron output. Estimated production was 98,834 tons a day, compared with 102,733 tons in June. Number of furnaces in blast Aug. 1 was 185, which was four less than on July 1.—Page 303.

* * *

Business activity may recede a little further, says Dr. Haney, but the recession will not be much more than seasonal, and is likely to be followed by a period of irregular stability.—Page 290.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

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Self-Government in Business

TRADE organizations, which have so multiplied in the last three years, have found a field of large usefulness in developing equitable business practices. In earlier years such associations existed in the shadowy fringe of the Sherman act, and even an expert counsel could not be sure that certain acts were legal. The Supreme Court decisions of 1925 cleared up the situation materially, with the result that co-operative and coordinating movements gathered momentum in all the ramifications of industry and trade. By informing the Federal Trade Commission and the Department of Justice of their activities, actual and proposed, the associations now move forward on definite lines, their freedom of action being restricted only in respect to agreements on prices that might be considered in restraint of trade.

Association members probably get the most tangible results from the interchange of information about production, stocks, distribution, competitive lines, cost keeping and credits. Governmental departments and bureaus find them the easiest and promptest sources of information about industry and the best avenue through which to approach such matters as standardization and simplification of practice. The public generally will be benefited by more stable business conditions, by improved quality of goods and by better trade practices.

It is this last item that is worthy of more remark. As an instance take furniture. Not so long ago a table made of painted gum wood with a little mahogany veneer on the top was sold as "mahogany furniture." When the dealers were reproached for this evident misbranding they replied that they were only doing what every one was doing and had been doing for years. They admitted that the practice was bad and would be glad to change it, but "the manufacturers would never agree." When the manufacturers were seen they told the same story of how they would like to reform, but they knew the dealers would never agree.

Obviously it was then a simple matter to get representative manufacturers and retailers into a conference and end misrepresentation in furniture. Such a stipulation on the branding of furniture has now been signed by more than 90 per cent of the industry. The result is unquestionably wholesome and redounds to the interest of the consuming public as well as of the trade. Truth in branding and advertising is a matter almost worthy of governmental regulation, but can be handled so much better by mutual consent.

Instances might be multiplied of long established practices, just over on the shady side, which have

been abandoned by reputable firms at the behest of their business associations. Of course, there will always be some non-cooperating firms who mistakenly think there will be selfish advantage in disregarding the general good. But once a trade practice is freely recognized as wholesome by an overwhelming majority of the members of an industry, as represented in a trade organization, it readily becomes a part of the code under which that industry practices self-government. And as we all know, government from within is far better than from without.

Must the Heat Treater Sweat?

IT is undoubtedly true that the recommended quenching temperatures for alloy and tool steels have been steadily rising during the past ten years. Furthermore, while a complicated treatment consisting of two or more heatings was once a rarity, the metallurgist today does not hesitate to specify it on many parts of extra duty or value. Even for so recently marketed a product as stainless steel, the makers are now telling their customers to quench it from a heat 100 degrees above what was usual when it was first exploited. The point is that the higher heat facilitates a higher saturation of chromium in the iron with a correspondingly better resistance to corrosion.

With these increasing temperatures furnace designers and the makers of refractory brick and heat resisting metals have had problems thrust upon them. Generally speaking, these new demands have been met, even if the cost at times has seemed excessive. Numerous special alloys for electrical resistors, furnace bottoms, and pots have been developed, and the purchaser usually has merely to balance the economies of a higher first cost against the longer life.

Higher temperatures also put a greater strain upon the heat treaters themselves; but it almost seems that they have been the last factor to receive consideration. One would imagine, on entering some heat treatment departments, that the management must think these skilled members of the organization are birds like the fabled phoenix, which flew out of an altar fire with never a tail feather singed. Else why would any one install heat-treating equipment operating at somewhere up to 2500 degrees Fahrenheit, blowing off white-hot furnace gases into a work room already superheated by a blazing summer sun? We find such operations in plants where it is evident from the variety of equipment, labor saving devices, and quality of work done, that much thought has been given to this important operation. Yet the men all have "sun-burned" noses and cheek bones. Perhaps a certain pride that they can

stand any heat which would wither a thin-skinned machinist keeps them at the sizzling job!

It has been said that the furnace gases should play around the rim of a lead pot in order to keep a crust from forming, and that the products of combustion should blow out a muffle door to guarantee a neutral atmosphere within. Even if this is true, it would not prevent building a generous hood with a vigorous suction fan to exhaust the gas. Nor would it prevent building brick flues to take away the gases from the larger stationary furnaces.

In fact, wherever large output is required, as in the Ford or Dodge factories, the manager does not hesitate to put a battery of furnaces right in the production line, flanked on either side by precision machine tools or other finishing operations.

Here the heat treater gets relief. He might well have first consideration in such installations; but the chances are the dust and smoke and heat were abolished because they don't mix at all well with good machine shop practice.

It would not be surprising to find that these smokeless, noiseless, heatless, heat-treating furnaces are more economical in the end than the more primitive types. A lower labor turnover and a better *esprit de corps* would overbalance a considerable increase in installation and maintenance expense. When all factors are considered, the best is always cheapest.

A Constructive Move in Sheets

AN important producer of sheets announces this week that after Oct. 1 its terms of payment will be 30 days net or one-half of 1 per cent discount for payment within 10 days of the date of the invoice. There are indications that like action will be taken by other sheet manufacturers, with the probability that in time the shortened discount will be as common in that branch of the industry as is now the 2 per cent that has been the practice for many years. Coming after a long series of efforts to advance sheet prices—efforts whose success has been rather in inverse proportion to the sheet trade's notorious need of a better profit—the new move takes on a significance beyond that ordinarily given to a detail of settlement between the buyer and the seller.

It is pointed out on behalf of the manufacturer that if the new discount on sheets becomes generally effective, all finished steel products would be on that basis apart from steel pipe, wire, tin plate and cold rolled strips. That is to say, as plates, shapes, bars and some other products now take but one-half of 1 per cent, there would be left slightly more than 25 per cent of the total of rolled steel subject to the 2 per cent discount.

It is further urged that this latter discount is the survival of the practice of the earlier years of long and uncertain credits, of wide swings in volume and prices, and of extreme fluctuations in the money market. Also, that 2 per cent for a 20-day anticipation of payment is equivalent to 36 per cent a year as against 9 per cent under the new arrangement—a rate which still gives a margin to the buyer who borrows to discount his bills.

The question will be raised whether there will be better success in establishing the short discount than

sheet manufacturers have had in advancing the market price of their product. Conditions seem to favor an affirmative answer. One consideration is that it is easier to secure general adhesion to a change in trade practice than to maintain a definite market price. Thus, two years ago makers of sheets recognized that selling prices had long been out of alinement with costs, heavy gages yielding a profit, while market prices on light gages represented bare cost or less than cost. After protracted effort, which involved scientific cost finding, No. 24 gage was made the base for black and galvanized sheets instead of No. 28 gage, and differentials were recast in line with rolling mill costs—an arrangement that promptly found acceptance throughout the trade. The net result of larger spreads on light gages and of reductions on some heavier gages was to establish the industry on a sounder basis, with somewhat better average return to mills rolling the full range of black and galvanized sheets.

It is significant that this week's move to better conditions in the sheet industry has for its background more than six months of sustained effort, in large part successful, to advance the heavier products—plates, shapes and bars—above the unprofitable level reached in the second half of 1927. Another factor of which account is to be taken is that a number of manufacturers of bars, plates and shapes have been at work on lines similar to those followed in the sheet industry two years ago, with a view to bringing extras for chemical content and for cutting and other services into better alinement with relative cost of production.

Westward Migration in Steel

OUR weekly market reviews of the past two years have made frequent mention of the higher rate at which steel plants in the Chicago district were operating, in comparison with those of the Pittsburgh and Youngstown districts. The statistical report of the American Iron and Steel Institute for 1927, issued this week, gives confirmation of these general statements and to some extent permits a statistical measure of the shift in steel production that has come since the abolition of Pittsburgh Plus. One of the tables gives the production of steel ingots by States, showing the output for 1927 in percentage of capacity at the beginning of the year. The average for the country was 75.48 per cent. Of the large producing States, two ran above this and three below, as follows:

	Per Cent
Indiana	88.03
Ohio	77.28
Illinois	73.97
Pennsylvania	71.52
New York	71.48

The smaller States cannot be referred to, as some of them are grouped together. However, State totals of steel ingots and castings combined are given, with very little bracketing, while there are separate tables for the Youngstown district and for Allegheny county, and the comparison can be pursued along that line. Total production of steel ingots and castings decreased almost 7 per cent from 1926 to 1927, but one observes that while Indiana (Gary and Indiana Harbor) lost only 1.8 per cent and Illinois only 4.2 per cent, the Youngstown district went down 11.7 per cent and Allegheny

county 11.0 per cent. West Virginia made the divergent showing of decreasing 8.9 per cent from 1925 to 1926, when the industry as a whole gained, and then increasing from 1926 to 1927 by 12.4 per cent, the cause of the decrease being presumably the abandonment of the Riverside plant of the National Tube Co., while one cause of the increase was the growth of the Weirton Steel Co.

Pennsylvania is the big State in ingot capacity, Ohio coming next but with less than two-thirds as much as Pennsylvania, while Indiana and Illinois combined do not equal Ohio. Comparisons by States, however, have limited value, for Pennsylvania has steel spread over almost its entire length, while Illinois and Indiana have steel only in one corner. In sequence the million-ton States in ingot capacity (representing nearly 93 per cent of the total) are as follows:

Pennsylvania ...	21,976,636	New York.....	2,819,350
Ohio	13,712,900	Alabama	2,140,000
Indiana	6,551,880	Maryland	1,662,600
Illinois	5,032,600	West Virginia...	1,180,000

These are capacities as of Dec. 31, 1927, the total of the United States being 59,435,766 gross tons. Residents of Detroit have lately acquired the impression that Michigan has become a great steel State, but it is assigned only 340,000 tons capacity, thus trailing distant California as well as Minnesota, on another edge of the country.

Added interest is given to these capacity statistics by the exhibits published elsewhere in this week's IRON AGE, comparing the rolling capacity in twelve different districts in nine classes of finished steel products. These are to be studied in connection with the reference made in the opening paragraph above to a possible relation between the shifts in steel making and the abolition of Pittsburgh Plus. Consideration should be given also to the development of new lines of finished steel manufacture in the Chicago district and to the increased use of waterways in the shipment of steel products, though to an extent these are to be reckoned as effects of the new regime of plural basing.

Changing Currents in Exports

THERE have been some notable gains in exports of steel products in the first half of the year, as compared with the first half of last year, and there have been some equally notable losses. Among the gains are 14,000 tons in steel bars (to which may be added 4500 tons more in alloy steel bars), nearly 24,000 tons in plain structural shapes and 9000 tons more in fabricated structural materials, nearly 12,000 tons in steel rails and an additional 9400 tons in rail fastenings, and 28,000 tons in wire products, of which 8000 tons was in plain wire, 15,000 tons in barbed wire and woven wire fencing and more than 5000 tons in wire nails.

Offsetting these gains, there have been losses of 11,000 tons in galvanized steel sheets, almost 28,000 tons in tin plate, nearly 27,000 tons in boiler tubes and other pipe and smaller amounts in other materials.

In the case of bars almost the whole gain came from increased shipments to Canada, which went from 34,700 tons to 46,500 tons. In plain heavy structural material Canada again accounted for most of the increase, exports to our Northern neighbor advancing from 54,000 tons to 75,500 tons. Rail shipments, how-

ever, took a different course. There was a gain of more than 20,000 tons in rails sent to Chile, almost 9000 tons in rails to Colombia and 8000 tons to China. Simultaneously, there was a decline of 11,000 tons in rail shipments to Japan, 7000 tons to Cuba and almost 4000 tons to Canada.

When it comes to wire shipments, Argentina made a heavy gain in plain and galvanized material, exports to that country having advanced from 557 tons to 4700 tons. Similarly with barbed wire and woven wire fencing; the exports to Argentina went up from 2353 tons a year ago to 8869 tons in the first half of this year. Under this classification Brazil also participated in the larger buying, taking more than 8650 tons, nearly double the 4800 tons of last year.

Reduction in shipments of tin plate is about half accounted for by the smaller takings of Argentina, which dropped from 24,000 tons to a little more than 10,000 tons. Brazil dropped off nearly 5000 tons, Great Britain 3800 tons, and Japan 3300 tons.

As a whole, the exports of the first half have shown a moderate improvement over those of last year. Deducting scrap exports, which have been more than twice as great this year as last, the total remains at 1,108,000 tons, against 1,029,000 tons last year.

With the prospect that the year's iron and steel exports will run in excess of the average of 2,120,000 tons in 1926 and 1927, which was 400,000 tons more than the average for 1924 and 1925, wonder will grow the more at the fantastic proposal of a New York banker in a public address last year that the steel manufacturers of the United States abandon export trade in steel in favor of their European competitors.

THE half-year index to THE IRON AGE covering the first six months of 1928 is now available for distribution. Those who have asked for the index in the past will receive it as before, so only those not on the list need make the request at this time, addressing the Reader Service Department, Iron Age Publishing Co., 239 West Thirty-ninth Street, New York.

CORRESPONDENCE

Oxyacetylene Flame Temperature

To the Editor: I was particularly interested in the statements about oxyacetylene flame temperature contained in your issue of July 26 (page 232), and I cannot refrain from quoting from a letter written to me by the late Prof. Joseph W. Richards on Oct. 15, 1916. He says that the theoretical temperature of the flame is 7250 deg. Fahr., and goes on:

"This solution neglects the small decomposition of CO₂ and H₂O at high temperatures, which would reduce this temperature some. I have not made that calculation, but it would probably reduce the temperature at the hottest part of the flame to 5400 deg. Fahr."

This is remarkably close to the figure (3100 deg. C. or 5600 deg. Fahr., in round numbers) obtained by Professor Henning in Germany. I referred to this in my paper that was read before the American Institute of Mining Engineers in February, 1918, the title of which was, "Some Structures in Steel Fusion Welds."

S. W. MILLER,

Consulting engineer Union Carbide and Carbon Research Laboratories, Inc.
Long Island City, N. Y.

Pig Iron Output Declined in July

Estimated Daily Rate of Production Was 3900 Tons or 3.8 Per Cent Less Than June Figure—Net Loss of Four Furnaces

TELEGRAPHED reports received by THE IRON AGE from all producers of pig iron in the United States, estimating their output for the last two days of July, indicate that daily production declined about 3.8 per cent, as compared with the June rate. These returns show a total estimated production of 3,063,841 tons or 98,834 tons daily during July. In the previous month total actual tonnage amounted to 3,082,000 tons, or 102,733 tons daily, the decrease in rate per day having been 3899 tons. In June there was a decrease from May of 3198 tons daily or 3 per cent.

According to these preliminary returns for July, six furnaces were blown in during the month and 10 blown out, a net loss of four furnaces. The loss was entirely in furnaces producing steel making iron, as the num-

Pig Iron Production by Districts, Gross Tons

	July (31 days)	June (30 days)	May (31 days)	April (30 days)
New York and Massachusetts.....	191,963	199,045	212,333	205,556
Lehigh Valley	64,845	60,640	77,195	81,140
Schuylkill Valley	53,738	52,434	53,162	60,062
Lower Susq. and Lebanon Valleys....	29,980	29,207	32,019	31,522
Pittsburgh District	581,972	606,223	700,880	663,784
Shenango Valley	88,467	101,543	114,779	100,073
Western Pennsylvania	120,584	117,833	126,790	116,405
Maryland, Virginia and Kentucky....	111,851	116,691	100,508	102,678
Wheeling District	154,172	145,717	124,948	115,284
Mahoning Valley	284,657	291,174	309,842	310,227
Central and Northern Ohio.....	382,636	349,952	357,900	336,200
Southern Ohio	43,936	40,810	26,380	25,548
Illinois and Indiana.....	635,071	635,201	694,636	693,271
Mich., Minn., Mo., Wis., Colo. and Utah	122,279	127,085	137,987	134,163
Alabama	189,411	200,643	207,045	199,487
Tennessee	8,279	7,802	7,452	10,104
Total	3,063,841	3,082,000	3,283,856	3,185,504

ber of merchant stacks remains unchanged, two having been blown in and two out. The number of blast furnaces operating on Aug. 1 was thus 185, as compared with 189 on

July 1 and 198 on June 1.

Estimated production by districts is shown in the accompanying table and complete data for July will be published in THE IRON AGE of Aug. 9.

Non-Ferrous Metal Institute Is Organized

The Non-Ferrous Ingot Metal Institute was organized at a meeting held at Atlantic City, N. J., on July 20, at which most of the principal producers of the non-ferrous ingot metal ratified a constitution and by-laws and elected officers and executive committee members.

The first officers of the institute are: President, Benjamin Harris of Benjamin Harris & Co., Chicago; vice-president, I. Gleuck, Federated Metals Corporation, New York; treasurer, L. Chapman, H. Kramer & Co., Chicago; members of executive committee, William Lewin, Lewin Metals Corporation, St. Louis, and W. J. Coane, Ajax Metal Co., Philadelphia. R. D. T. Hollowell, experienced in trade organization work and at present secretary-treasurer of the American Face Brick Association, will shortly assume the management of the institute. Headquarters will be in Chicago.

"It is the ideal of the members of the institute," said Mr. Harris, "to develop policies which will be of constructive benefit both to the industry and the consuming public. It will be our purpose to build slowly and soundly, drawing freely upon the best in modern, conservative thought to determine the institute's objectives. With this policy in view, the initial activity will be to make a survey of the problems of both the manufacturers and consumers. Not until this survey has been completed will the institute attempt to determine which

of the many possible activities it will pursue. We will undoubtedly undertake, sooner or later, extensive technical researches into the problems of manufacture and utility of non-ferrous ingot metals, commercial re-



BENJAMIN HARRIS

searches to determine how we may better serve our present customers and locate new fields for development, the adoption and promotion of the use of high standards of quality and specifications, the encouragement of sound business practices, voluntarily aiding in the prevention of unfair competition and trade abuses, and the promotion of intelligent business management on a basis of wholesome competition."

Statistical Iron and Steel Report for 1927

Several new tables have been added in the 1927 Annual Statistical Report of the American Iron and Steel Institute which are not to be found in earlier editions. Principal among them are those relating to foreign countries. Seven pages of production figures for the principal producing countries cover iron ore, pig iron and ferroalloys and steel ingots and castings. These are for more than 20 countries and, so far as data are available, are given for all the elapsed years of the twentieth century. Eight pages of new data cover, for 1923 to 1927, inclusive, exports of various leading iron and steel products from the United States to the principal consuming countries beyond our borders.

"Practical capacity" has been abandoned as a measure of current operation. What formerly was called "theoretical capacity" is now used, but it is called merely "capacity."

Otherwise, with a few exceptions, the volume, which is now 119 pages in place of 102 last year, is much as it has been before—a vast storehouse of data on the years' production of iron and steel products of various sorts, grouped as experience has shown will be valuable. Pig iron, ingots and castings, rolled products—these are the chief divisions. But to this is appended much other information, tributary or otherwise, which steel men and those studying their problems like to have in such convenient form.

Iron and Steel Markets

August Opens with Unusual Promise

Demand Shows Expanding Tendency—Smaller Recession in
July Pig Iron Output Than a Year Ago—New
Cash Discount for Sheets

MARKET developments in steel are on the up side. Demand, which brought July output close to that of June, shows more of a tendency to expand than to contract in August. Bookings with most companies have slightly exceeded shipments, and unfilled orders have thus gained in the past month. There is less selling pressure, and from all the main producing centers is reported a gathering of price firmness as a result. Also, here and there is evidence of a disposition to cover for forward business.

Operations are easily at a 75 per cent of capacity rate, sustained by buying which is chiefly for immediate needs from many varied consuming industries. And no one of these is promising an early increase of notable proportions.

Bar mill products have bulked large in the unusual summer activity, which has brought sales in the past week, as in Chicago, to the average of the year to date. The 1.90c., Pittsburgh, price is the basis of new transactions, but they cover only a small tonnage. Large users are on mill books at lower levels, but mills are beginning to insist on prompt specifying to avoid carry-overs beyond the contract period.

Sheets are moving in a better volume, with sheet mills generally operating at an 85 per cent rate. Some recession in fresh orders from the automobile builders is explained by the delays commonly met in getting into full production on new models.

Important action has just been taken in the sheet trade by the American Rolling Mill Co., with indications it will be followed by other sheet makers generally. Instead of allowing a discount of 2 per cent for payments in 10 days, the discount will be $\frac{1}{2}$ per cent, as has applied for years to practically all hot-rolled products. This change in trade practice may add \$4,000,000 to \$5,000,000 per annum to sheet mill incomes.

Plate bookings of 7000 tons for oil storage tanks are reported from Chicago, and welded pipe makers are pressing for deliveries, with one sale of 12,000 tons of plates for such pipe. Car repair and rebuilding programs of the railroads are a sustaining factor. In oil well casing, Venezuela placed 1000 tons in the United States and 500 tons in Germany.

In the railroad equipment field has appeared an inquiry from the New York Central Lines for 55 locomotives and from the Chesapeake & Ohio for 500 gondola car bodies. The Chicago & Eastern Illinois bought 100 automobile cars.

In rails small orders are allowing mills to hold

operations above expectations. The Wheeling & Lake Erie bought 2500 tons.

July contracts for structural steel were heavy, an Eastern steel company reporting its bookings as the largest of any month this year. Considerable work is in prospect, including 16,600 tons for the Reynolds Tower Building in New York, which is to exceed the Woolworth Building in height, 15,000 tons for a Wall Street bank and office building, and 15,000 tons for the Chicago Board of Trade Building.

Pig iron returns for July, collected by telegraph, with all producers heard from and estimating the last two days, showed a production of 3,063,841 gross tons, or 98,834 tons a day, compared with 3,082,000 tons in June, or 102,733 tons a day. The recession is thus 3.8 per cent, but the daily output in July, 1927, which was 95,199 tons, fell off over $7\frac{1}{2}$ per cent from June, 1927. On Aug. 1, there were 185 furnaces active, four less than on July 1.

Movement of pig iron to consumers is heavier than usual at this season, especially in the Ohio-Michigan territory, and there are signs in various markets of increasing buying interest in requirements for the rest of the year. Prices show little strength, however, and have given ground at St. Louis, where foundry grades have been marked down 50c. a ton, and in eastern Pennsylvania, where a 20,000-ton purchase of basic iron brought out prices 25c. a ton lower. Sales at Cleveland were 40,000 tons, the largest week's business since April.

A move toward elimination of preferential prices of \$1 or \$2 a ton, which many consumers and jobbers have been enjoying, notably on wire products, has been begun by some of the larger steel companies. A one-price policy, with extras for small lots, is the aim.

Exports of iron and steel, excluding scrap, were 197,000 gross tons in June, against 203,700 tons in May. In June, 1927, the total was 158,500 tons. For the half-year, exports have been 1,108,000 tons, compared with 1,029,000 tons last year. Including scrap, these figures become 1,358,742 tons and 1,133,427 tons respectively.

Iron and steel imports in June were 65,819 gross tons, comparing with 72,106 tons in the preceding month and 69,017 tons a year ago. Finished material was 33,789 tons in June, a drop of 13 per cent from the 38,968 tons of June, 1927.

Both of THE IRON AGE composite prices remain at last week's levels. That for pig iron is \$17.04 a ton and that for finished steel is 2.319c. a lb.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron, Per Gross Ton:	July 31, 1928	July 24, 1928	July 2, 1928	Aug. 2, 1927
No. 2 fdy., Philadelphia.....	\$20.26	\$20.26	\$20.76	\$20.76
No. 2, Valley furnace.....	16.50	16.50	16.75	18.00
No. 2, Southern, Cin'ti.....	19.19	19.19	19.19	20.94
No. 2, Birmingham.....	15.50	15.50	15.50	17.25
No. 2 foundry, Chicago.....	17.50	17.50	18.00	19.50
Basic, del'd eastern Pa.....	19.00	19.00	19.00	20.75
Basic, Valley furnace.....	16.00	16.00	16.00	17.50
Valley Bessemer, del'd P'gh..	18.76	18.76	18.76	20.26
Malleable, Chicago.....	17.50	17.50	18.00	19.50
Malleable, Valley.....	17.00	17.00	17.00	18.00
Gray forge, Pittsburgh.....	18.01	18.01	18.01	19.26
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace.....	105.00	105.00	105.00	90.00

Rails, Billets, etc., Per Gross Ton:	July 31, 1928	July 24, 1928	July 2, 1928	Aug. 2, 1927
O.-h. rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Bess. billets, Pittsburgh.....	32.00	32.00	32.00	33.00
O.-h. billets, Pittsburgh.....	32.00	32.00	32.00	33.00
O.-h. sheet bars, P'gh.....	32.00	32.00	32.00	34.00
Forging billets, P'gh.....	38.00	38.00	38.00	39.00
O.-h. billets, Phila.....	37.30	37.30	38.30	38.30
Wire rods, Pittsburgh.....	42.00	42.00	42.00	43.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.....	1.85	1.85	1.85	1.80

Finished Iron and Steel,	Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia.....	2.12	2.12	2.12	2.12	
Iron bars, Chicago.....	2.00	2.00	2.00	2.00	
Steel bars, Pittsburgh.....	1.85	1.85	1.85	1.80	
Steel bars, Chicago.....	2.00	2.00	2.00	2.00	
Steel bars, New York.....	2.19	2.19	2.19	2.14	
Tank plates, Pittsburgh.....	1.85	1.85	1.85	1.80	
Tank plates, Chicago.....	2.00	2.00	2.00	2.00	
Tank plates, New York.....	2.17 1/2	2.17 1/2	2.17 1/2	2.09	
Beams, Pittsburgh.....	1.85	1.85	1.85	1.80	
Beams, Chicago.....	2.00	2.00	2.00	2.00	
Beams, New York.....	2.14 1/2	2.14 1/2	2.14 1/2	2.04	
Steel hoops, Pittsburgh.....	2.20	2.20	2.20	2.30	

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Sheets, Nails and Wire,	July 31, 1928	July 24, 1928	July 2, 1928	Aug. 2, 1927
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh....	2.60	2.60	2.65	3.00
Sheets, black, No. 24, Chicago				
dist. mill.....	2.75	2.75	2.75	3.10
Sheets, galv., No. 24, P'gh....	3.40	3.40	3.50	3.85
Sheets, galv., No. 24, Chicago				
dist. mill.....	3.60	3.60	3.60	3.95
Sheets, blue, 9 & 10, P'gh....	2.00	2.00	2.00	2.25
Sheets, blue, 9 & 10, Chicago				
dist. mill.....	2.10	2.10	2.10	2.35
Wire nails, Pittsburgh.....	2.55	2.55	2.55	2.55
Wire nails, Chicago dist. mill..	2.60	2.60	2.60	2.60
Plain wire, Pittsburgh.....	2.40	2.40	2.50	2.40
Plain wire, Chicago dist. mill..	2.45	2.45	2.55	2.45
Barbed wire, galv., Pittsburgh.	3.20	3.20	3.35	3.25
Barbed wire, galv., Chicago				
dist. mill.....	3.25	3.25	3.40	3.30
Tin plate, 100 lb. box, P'gh....	\$5.25	\$5.25	\$5.25	\$5.50

Old Material, Per Gross Ton:	July 31, 1928	July 24, 1928	July 2, 1928	Aug. 2, 1927
Heavy melting steel, P'gh.....	\$14.25	\$14.25	\$14.00	\$15.25
Heavy melting steel, Phila.....	13.00	13.00	13.00	13.00
Heavy melting steel, Ch'go.....	12.50	12.25	12.25	12.50
Carwheels, Chicago.....	12.75	12.75	13.00	14.50
Carwheels, Philadelphia.....	15.50	15.50	15.50	15.00
No. 1 cast, Pittsburgh.....	14.25	14.25	14.25	15.00
No. 1 cast, Philadelphia.....	15.50	15.50	15.50	16.00
No. 1 cast, Ch'go (net ton)...	13.50	13.50	13.50	15.00
No. 1 RR. wrot., Phila.....	13.50	13.50	13.50	15.50
No. 1 RR. wrot., Ch'go (net)...	10.75	10.75	11.00	12.00

Coke, Connellsville, Per Net Ton at Oven:	July 31, 1928	July 24, 1928	July 2, 1928	Aug. 2, 1927
Furnace coke, prompt.....	\$2.75	\$2.60	\$2.60	\$3.00
Foundry coke, prompt.....	3.75	3.75	3.75	4.00

Metals,	Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	14.75	14.75	14.87 1/2	13.37 1/2	
Electrolytic copper, refinery...	14.50	14.50	14.50	13.00	
Zinc, St. Louis.....	6.20	6.20	6.20	6.40	
Zinc, New York.....	6.55	6.55	6.55	6.75	
Lead, St. Louis.....	6.00	6.00	6.15	6.45	
Lead, New York.....	6.20	6.20	6.30	6.60	
Tin (Straits), New York.....	47.75	48.00	46.12 1/2	65.50	
Antimony (Asiatic), N. Y.....	10.00	9.37 1/2	9.62 1/2	12.25	

Pittsburgh

Sustained Demand for Steel Keeps Ingot Output at 75 Per Cent—Stronger Stand on Prices

PITTSBURGH, July 31.—The steel market continues to surprise by a sustained demand at a time of year when it is usually on a tapering scale. In ingot production it shows more of a tendency to expand than to contract. Ingot production in the combined Pittsburgh, Youngstown, Wheeling and Johnstown districts is easily 75 per cent of capacity. In Youngstown, open-hearth furnace operations are more than 80 per cent, but the general average of that district is somewhat reduced by a rather low rate of Bessemer converter operation. A few low spots in plant engagement in the Pittsburgh district proper are more than counterbalanced by substantially full operation of steel works in Weirton and Steubenville. Based upon the number of active productive units, July is ending more actively than it began and, so far as this district is concerned, the month's ingot output, it is believed, will be very little smaller than that of June.

Wire products, as usual at this season of the year, are in light demand. While there has been some increase in the demand for oil country pipe, it has not assumed proportions sufficient to lift the market out of dullness. Rails and track fastenings are experiencing the quietness common to this time of the year. Bolts, nuts and rivets also are slow. In other finished steel products, however, business is

good, particularly for this season. Tin plate makers are freed from concern about new business between now and the end of September. Sheet business is active and there is cheerfulness in the reports as to the specifications for bars and shapes.

Railroad buying of sheets, done in quiet fashion, turns out to have been appreciably larger for at least one producer than it was in the corre-

sponding period last year. Generally, however, railroad buying has been disappointing in that it has not included many cars or locomotives, which not only mean orders for steel, but engagement of a good many fabricating plants.

The difference between present demand from the motor car builders and that of a month or two ago is very slight. This industry has had an exceptional season in production and sales; the question now is as to whether as the fall approaches the demand will continue as strong as it is now and whether the steel requirements of this industry will hold up to their present rate.

Pittsburgh has a favorable prospect in steel construction projects, but as they run heavily to railroad, Federal and county work, lettings are likely to be spread out over a longer period than if they were private ventures.

The movement toward a stronger price stand is gaining ground. Selling pressure in sheets and strips, which have been the weakest in the finished steel list, appears to be abating and on these lines there is increasing talk

of an advance on fourth quarter business.

Pig iron demands are small individually and in the aggregate. Scrap prices appear to be sustained more by dealer than consumer buying. The first change in spot furnace coke prices since the latter part of February has been an advance of 15c. a ton, brought about by a demand from a steel company to supplement its own production, which has swept the market bare of spot supplies suitable for blast furnace use.

Pig Iron.—There is a reasonably heavy movement of iron on old orders, but new business consists chiefly of the actual necessities of the smaller melters, who rarely buy much in advance of their known requirements. Some producers believe that the price situation is a little stronger, but the only evidence to support this is that Valley foundry iron has moved to certain Ohio points at which Cleveland furnaces have some advantage in freight charges over the Valley producers. In this district, on account of the changed mode of buying and the fact that melters rarely send out inquiries for iron, it is necessary for sellers to canvass the trade thoroughly and frequently. Such efforts mean orders but do not impress the buyer with the possibility of shortages of iron or of higher prices.

Prices per gross ton, f.o.b. Valley furnace:	
Basic	\$16.00
Bessemer	17.00
Gray forge	\$16.25 to 16.50
No. 2 foundry	16.50 to 16.75
No. 3 foundry	16.25 to 16.50
Malleable	17.00
Low phos., copper free....	26.50

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Ferroalloys.—Not much new business is developing, but consumers are taking shipments against contract commitments at a rate quite satisfactory to producers. Only a few of the larger users of ferromanganese failed to make provision against having to pay the advanced price effective on last half tonnages, and some have enough tonnage bought at \$100, Atlantic seaboard, to supply their needs through this quarter.

Semi-Finished Steel.—Billets, slabs and sheet bars are moving well on contracts generally priced at \$32,

Pittsburgh, for this quarter. Sheet and tin plate producers are well supplied with business; in strips, orders are making a good showing for this time of the year and July bookings have been only slightly behind those of June. Fresh purchases do not amount to much. Wire rods are only moderately active; the ruling price is \$42, base, Pittsburgh, but some tonnage placed at less and carried over by producers figures in the mill deliveries.

Bars, Plates and Shapes.—Bars and shapes are moving well on contracts, but in plates, both orders and specifications are rather light. So far as strictly new business is concerned, 1.90c., base Pittsburgh, now is minimum, but with the generous coverage given contract buyers at 1.85c., there is little new business except from small-lot buyers. The mills, however, are insistent that buyers specify on their 1.85c. contracts in the effort to avoid carrying any tonnage at that price beyond this quarter. This district has promising prospects for the next year in structural projects. Three bridges that will take 20,000 tons or more of steel are to be provided for from the \$43,000,000 county bond issue recently approved by the voters. A new Federal building is in sight for Pittsburgh, and the Pennsylvania Railroad is expected to spend about \$50,000,000 in bettering its local terminal facilities. That road has placed 1100 tons for a fruit auction shed at its local freight yards.

Rails and Track Supplies.—This is rarely an active period in rails and track fastenings, and this year is no exception. Prices show no change.

Wire Products.—The price situation is more stable than manufacturers have experienced in a long time. Nails are well established at \$2.55, base, per keg, Pittsburgh, and plain wire at \$2.40, base, per 100 lb., and no deviations from these prices are reported. Business is very quiet.

Tubular Goods.—A good many pipe line projects are reported to be under consideration, but producers take more satisfaction from the fact that actual orders for oil country pipe show a moderate but sustained increase and

that building and construction pipe is going out steadily. The secondary market, following a revision in the resale quotations which resulted in lower open prices, but an advance in actual sales prices, is really steady for the first time in at least two years. In tubing the best movement appears to be in the requirements of the motor car builders.

Sheets.—Business continues good, and while prices are not actually higher than they have been, the undertone of the market is firmer and an effort toward establishing 2c., base, on blue annealed, 2.65c., base, on black, and 3.50c., base, on galvanized, is finding a more general following. Although the common impression is that the railroads have not been taking much steel, a checkup by a local maker of sheets discloses that business from that source made a good gain in the second quarter over the first three months of the year and that the record for the first half of this year is appreciably better than for the same period last year. The American Sheet & Tin Plate Co. last week operated at 80 per cent of capacity and is scheduled at approximately that rate for this week. Independent mill operations are somewhat higher and the industry as a whole is running at around 85 per cent.

Tin Plate.—Production keeps up at a high rate in spite of the effect of hot weather upon mill crews. Some urgency of demand is indicated by the fact that the American Sheet & Tin Plate Co., in order to make good any loss of production due to hot weather, has been scheduling its mills on a 17-turn basis. Few makers can take sizable orders now for delivery before the middle or latter part of September.

Cold-Finished Steel Bars and Shafting.—There is little variation from week to week in the rate of mill shipments. The common report is that specifications are good for the time of year. There is nothing new as to prices.

Hot-Rolled Flats.—While July has not done so well as June in point of specifications and shipments, it is generally regarded as a satisfactory

THE IRON AGE Composite Prices

Finished Steel July 31, 1928, 2.319c. a Lb.

One week ago	2.319c.
One month ago	2.341c.
One year ago	2.367c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products constitute 87 per cent of the United States output of finished steel.

	High		Low	
1928	2.364c.,	Feb. 14:	2.314c.,	Jan. 3
1927	2.453c.,	Jan. 4:	2.293c.,	Oct. 25
1926	2.453c.,	Jan. 5:	2.403c.,	May 18
1925	2.560c.,	Jan. 6:	2.396c.,	Aug. 18
1924	2.789c.,	Jan. 15:	2.460c.,	Oct. 14
1923	2.824c.,	Apr. 24:	2.446c.,	Jan. 2

Pig Iron July 31, 1928, \$17.04 a Gross Ton

One week ago	\$17.04
One month ago	17.25
One year ago	18.34
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1928	\$17.75,	Feb. 14:	\$17.04,	July 24
1927	19.71,	Jan. 4:	17.54,	Nov. 1
1926	21.54,	Jan. 5:	19.46,	July 13
1925	22.50,	Jan. 13:	18.96,	July 7
1924	22.88,	Feb. 26:	19.21,	Nov. 3
1923	30.86,	Mar. 20:	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base Per Lb.
F.o.b. Pittsburgh mill.....	1.85c. to 1.90c.
F.o.b. Chicago.....	2.00c.
Del'd Philadelphia.....	2.17c. to 2.22c.
Del'd New York.....	2.19c. to 2.24c.
Del'd Cleveland.....	2.04c. to 2.09c.
F.o.b. Cleveland.....	1.85c.
F.o.b. Lackawanna.....	1.95c. to 2.00c.
F.o.b. Birmingham.....	2.05c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills.....	1.95c. to 2.00c.
F.o.b. Birmingham.....	2.05c. to 2.15c.

Rail Steel

F.o.b. mills east of Chicago district.....	1.75c.
F.o.b. Chicago Heights mill.....	1.85c.

Iron

Common iron, f.o.b. Chicago.....	2.00c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

Base Per Lb.

F.o.b. Pittsburgh mills.....	1.85c. to 1.90c.
F.o.b. Chicago.....	2.00c.
F.o.b. Birmingham.....	2.05c.
Del'd Cleveland.....	2.04c. to 2.09c.
Del'd Philadelphia.....	2.10c. to 2.15c.
F.o.b. Coatesville.....	2.00c. to 2.05c.
F.o.b. Sparrows Point.....	2.00c.
F.o.b. Lackawanna.....	1.95c. to 2.00c.
Del'd New York.....	2.17½c. to 2.22½c.
C.i.f. Pacific ports.....	2.25c. to 2.30c.

Structural Shapes

Base Per Lb.

F.o.b. Pittsburgh mills.....	1.85c. to 1.90c.
F.o.b. Chicago.....	2.00c.
F.o.b. Birmingham.....	2.05c.
F.o.b. Lackawanna.....	1.95c. to 2.00c.
F.o.b. Bethlehem.....	2.00c. to 2.05c.
Del'd Cleveland.....	2.04c. to 2.09c.
Del'd Philadelphia.....	2.01c. to 2.18c.
Del'd New York.....	2.14½c. to 2.19½c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

Base Per Lb.

Narrower than 3 in., P'gh.....	2.10c. to 2.20c.
From 3 in. to 6 in., P'gh.....	1.85c. to 2.00c.
6 in. and wider, P'gh.....	*1.75c. to 1.90c.
Narrower than 3 in., Chicago.....	2.30c.
From 3 to 6 in., Chicago.....	2.20c.
6 in. and wider, Chicago.....	2.00c.
Cotton ties, f.o.b. Atlantic and Gulf ports:	
Carlots per 45-lb. bundle.....	\$1.27
2000 bundle lots.....	1.25
Larger lots.....	1.23

*Mills follow plate or sheet prices according to gage on wider than 12 in.

Cold-Finished Steel

Base Per Lb.

Bars, f.o.b. Pittsburgh mills.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.15c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 2.90c.
Strips, 1 up to 3 tons, P'gh.....	2.90c. to 3.00c.
Strips, 1 up to 3 tons, Cleveland.....	2.90c.
Strips, 1 up to 3 tons, del'd Chicago.....	3.30c.
Strips, 1 up to 3 tons, Worcester.....	3.15c. to 3.30c.
Fender stock, Pittsburgh.....	4.10c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)

Base Per Keg

Wire nails.....	\$2.55
Galvanized nails.....	4.55
Galvanized staples.....	3.25
Polished staples.....	3.00
Cement coated nails.....	2.55

Base Per 100 Lb.

Bright plain wire, No. 9 gage.....	\$2.40
Annealed fence wire.....	2.55
Spring wire.....	3.40
Galv'd wire, No. 9.....	3.00
Barbed wire, galv'd.....	3.20
Barbed wire, painted.....	2.95

Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass., (wire) mill \$3 a ton higher on production of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.

Woven Wire Fence

Base to Retailers Per Net Ton

F.o.b. Pittsburgh.....	\$65.00
F.o.b. Cleveland.....	65.00
F.o.b. Anderson, Ind.....	66.00
F.o.b. Chicago district mills.....	67.00
F.o.b. Duluth.....	68.00
F.o.b. Birmingham.....	68.00

Sheets

Blue Annealed

Base Per Lb.

Nos. 9 and 10, f.o.b. P'gh.....	2.00c. to 2.10c.
Nos. 9 and 10, f.o.b. Chicago dist. mill.....	2.10c.
Nos. 9 and 10, del'd Cleveland.....	2.09c. to 2.19c.
Nos. 9 and 10, del'd Philadelphia.....	2.32c. to 2.42c.
Nos. 9 and 10, f.o.b. Birmingham.....	2.20c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.60c. to 2.65c.
No. 24, f.o.b. Chicago dist. mill.....	2.75c.
No. 24, del'd Cleveland.....	2.74c. to 2.84c.
No. 24, del'd Philadelphia.....	2.97c. to 3.07c.
No. 24, f.o.b. Birmingham.....	2.90c.

Metal Furniture Sheets

No. 24, f.o.b. Pittsburgh, A grade.....	3.85c. to 3.90c.
No. 24, f.o.b. Pittsburgh, B grade.....	3.65c. to 3.70c.

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.40c. to 3.55c.
No. 24, f.o.b. Chicago dist. mill.....	3.60c.
No. 24, del'd Cleveland.....	3.54c. to 3.69c.
No. 24, del'd Philadelphia.....	3.72c. to 3.82c.
No. 24, f.o.b. Birmingham.....	3.65c. to 3.70c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.85c. to 2.90c.
No. 28, f.o.b. Chicago dist. mill.....	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.00c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill primes.....	4.10c.
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Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.25
Standard cokes, f.o.b. Gary.....	5.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per package, 20 x 28 in.)

8-lb. coating I.C.\$11.20	25-lb. coating I.C.\$16.70
15-lb. coating I.C. 14.00	30-lb. coating I.C. 17.75
20-lb. coating I.C. 15.30	40-lb. coating I.C. 19.85

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quality Bar Base, 2.65c.

S.A.E. Series Numbers	Alloy Differential	Net Price 100 Lb. Bars
2000 (¼% Nickel).....	0.25	\$2.90
2100 (1½% Nickel).....	0.55	3.20
2300 (3½% Nickel).....	1.50	4.15
2500 (5% Nickel).....	2.25	4.90
3100 Nickel Chromium.....	0.55	3.20
3200 Nickel Chromium.....	1.35	4.00
3300 Nickel Chromium.....	3.80	6.45
3400 Nickel Chromium.....	3.20	5.85
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50	3.15
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70	3.35
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05	3.70
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35	3.00
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45	3.10
5100 Chromium Spring Steel.....	0.20	2.85
6100 Chromium Vanadium Bars.....	1.20	3.85
6100 Chromium Vanadium Spring Steel.....	0.95	3.60
9250 Silicon Manganese Spring Steel.....	0.25	2.90
Chromium Nickel Vanadium.....	1.50	4.15
Carbon Vanadium.....	0.95	3.60

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 down to and including 2½ in. squares, the price is \$5 a gross ton above the 4 x 4 billet price. Slabs with sectional area of 16 in. or over carry the billet price; slabs with sectional area of 12 in. to 16 in. carry a \$5 extra above the billet price and slabs with a sectional area under 12 in. carry the bar price. Band sizes are 40c. per 100 lb. higher.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

Base Per 100 Lb.

Spikes, ¾ in. and larger.....	\$2.80
Spikes, ½ in. and smaller.....	2.80
Spikes, boat and barge.....	3.00
Tie plates, steel.....	2.15
Angle bars.....	2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
1/8.....	45	19½	1/4 to ¾.....	+11	+39
1/4 to ¾.....	51	25½	¾.....	22	2
¾.....	56	42½	¾.....	28	11
¾.....	60	48½	1 to 1½.....	30	13
1 to 3.....	62	50½			

Lap Weld

2.....	55	43½	2.....	23	7
2½ to 6.....	59	47½	2½.....	26	11
7 and 8.....	56	43½	3 to 6.....	28	13
9 and 10.....	54	41½	7 to 12.....	26	11
11 and 12.....	53	40½			

Butt Weld, extra strong, plain ends

1/8.....	41	24½	1/4 to ¾.....	+19	+54
1/4 to ¾.....	47	30½	¾.....	21	17
¾.....	53	42½	¾.....	28	12
¾.....	58	47½	1 to 1½.....	30	14
1 to 1½.....	60	49½			
2 to 3.....	61	50½			

Lap Weld, extra strong, plain ends

2.....	53	42½	2.....	23	9
2½ to 4.....	57	46½	2½ to 4.....	29	15
4½ to 6.....	56	45½	4½ to 6.....	28	14
7 to 8.....	52	39½	7 to 8.....	21	7
9 and 10.....	45	32½	9 to 12.....	16	2
11 and 12.....	44	31½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel	Charcoal Iron
2 to 2½ in.....	27
2½ to 3 in.....	37
3 in.....	40
3½ to 4 in.....	42½
4 to 13 in.....	46
	3½ to 4½ in..... 9

Beyond the above base discounts, the following extra discounts are given:

Lap Weld Steel	Charcoal Iron
Under 5000 lb..	4 Fives
5000 lb. to 12,000 lb.....	5 Fives
12,000 lb. to 21,000 lb.....	6 Fives
21,000 lb. and over.....	7 Fives
	2 Tens & 2½
	2 Tens & 5

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.....	63	3 in.....	48
1½ to 1¾ in.....	55	3½ to 3¾ in.....	50
1¾ in.....	59	4 in.....	53
2 to 2½ in.....	54	4½, 5 and 6 in.....	45
2½ to 3 in.....	42		

Hot Rolled

2 and 2½ in.....	40	3½ and 3¾ in.....	56
2½ and 2¾ in.....	48	4 in.....	59
3 in.....	54	4½, 5 and 6 in.....	48

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tubes list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base (carloads).....	55
Carbon, 0.30% to 0.40%, base.....	50
Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

month because it ran so well ahead of the average for that month in the past few years. Prices are not quotably higher, but there is evidence that makers are tiring of doing business at prices that yield little, or at best a moderate profit, and selling pressure is lighter than it has been. In line with the tendency in some of the other finished steel products, it is expected that higher prices will be asked on fourth quarter tonnages. The common prices of local producers are 1.80c. to 1.90c., base, for wide strips, 2c. for 3-in. to 6-in., and 2.10c. to 2.20c. for less than 3-in. widths, while cooperage stock does not appear to be going at less than 2.30c.

Cold-Rolled Strips.—There has been much less than the usual summer dip in orders. This fact, coupled with the small profit that present prices yield, is reflected in a lessened anxiety for orders and a slightly steadier price situation. Makers generally are talking of an advance on fourth quarter business.

Bolts, Nuts and Rivets.—Business is rather slow in these products and is easily accommodated by a plant engagement of about 50 per cent of capacity. Railroad buying is at very close range and for real requirements. Lack of volume from this direction is an important factor in the dullness. Prices are still firm.

Coke and Coal.—Spot furnace coke has stiffened in price in the past few days, and against fairly liberal offerings recently at as low as \$2.60 to \$2.65, per net ton, at ovens, there are now no supplies of coke suitable for blast furnace use at less than \$2.75c. A steel company has been picking up spot tonnages steadily and it is said will be in the market for the next month or so, as its own by-product oven production is insufficient for its requirements. Beehive oven furnace coke production lately has been slipping steadily and it is doubt-

ful if much capacity now idle will be brought into production, since even at today's price the profit is not large enough to encourage repairs to idle ovens. Two Valley merchant producers of pig iron, which formerly operated their furnaces on beehive coke, now are running on by-product coke from steel company ovens, the coal being furnished by the buyers. Spot foundry coke still is in ample supply and rather easy in price. Some coal is moving to the Lakes, but otherwise the demand is slow and prices still are weak.

Old Material.—Blast furnace grades of scrap are higher, but generally the market is quotable at the levels of a week ago. Open-hearth grades are firm, as offerings are moderate and dealers with short orders to fill are covering them as fast as they can, usually at \$14 for heavy melting steel and in some cases at a little more. It is commonly realized that sales of a few weeks ago at \$14 were poor ones from the standpoint of profits, and with the possibility that steel works operations and scrap requirements will be larger in another 30 or 45 days, most sellers are inclined to take a small loss than run the risk of a larger one later. The August scrap list of the Pennsylvania Railroad contained approximately 36,000 net tons and that of the Baltimore & Ohio 10,020 gross tons. As dealers are bullish,

it is believed these lists will realize rather stiff advances over current prices.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$14.00 to \$14.50
Scrap rails	13.50 to 14.00
Compressed sheet steel....	13.75 to 14.00
Bundled sheets, sides and ends	13.00 to 13.25
Cast iron carwheels.....	14.00 to 14.50
Sheet bar crops, ordinary....	14.50 to 15.00
Heavy breakable cast....	11.75 to 12.25
No. 2 railroad wrought....	14.00 to 14.50
Heavy steel axle turnings....	13.00 to 13.50
Machine shop turnings....	9.50 to 10.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	15.00 to 15.50
Railr. coil and leaf springs	15.00 to 15.50
Rolled steel wheels.....	15.00 to 15.50
Low phos. billet and bloom ends	19.00 to 19.50
Low phos., mill plate.....	17.50 to 18.00
Low phos., light grade....	16.50 to 17.00
Low phos. sheet bar crops....	17.50 to 18.00
Hvy. steel axle turnings....	13.00 to 13.50
Electric Furnace Grades:	
Low phos. punchings.....	16.00 to 16.50
Hvy. steel axle turnings....	13.00 to 13.50
Blast Furnace Grades:	
Short shov'l'g steel turnings	10.00 to 10.50
Short mixed borings and turnings	10.00 to 10.50
Cast iron borings.....	10.00 to 10.50
No. 2 busheling	9.00 to 9.50
Rolling Mill Grades:	
Steel car axles	18.00 to 18.50
No. 1 railroad wrought....	10.50 to 11.00
Sheet bar crops	16.00 to 16.50
Cupola Grades:	
No. 1 cast	14.25 to 14.50
Rails 3 ft. and under.....	15.00 to 15.50
Malleable Grades:	
Railroad	14.00 to 14.50
Industrial	13.00 to 13.50
Agricultural	12.50 to 13.00

REINFORCING STEEL

OUTSTANDING among awards of 5400 tons reported during the last week were a bridge at Providence, R. I., which took 1800 tons, and a railroad terminal warehouse in New York requiring 1200 tons. A manufacturing building in Chicago calls for 2000 tons of the 2700 tons needed for new projects. Awards follow:

CAMBRIDGE, MASS., 100 tons, Boston & Maine Railroad warehouse, to Joseph T. Ryerson & Son.

BOSTON, 100 tons, Charles Street Garage Corporation, Cambridge Street, to Edwin A. Tucker.

PROVIDENCE, R. I., 1800 tons, Memorial Bridge; from Merritt-Chapman & Scott Corporation, general contractor, to McClintic-Marshall Co.

NEW YORK, 1200 tons, terminal warehouse for Lehigh Valley Railroad at 144th Street and Girard Avenue, to Concrete Steel Co.

CREIGHTON, PA., 100 tons, Pittsburgh Safety Glass Co., to Carlem Engineering Co.

CHICAGO, 100 tons, apartment building for H. B. Ryan, to Concrete Engineering Co.

CHICAGO, 200 tons of rail steel, caissons for Mercantile Mart, to Inland Steel Co.

CHICAGO, 900 tons, instead of 300 tons recently reported, plant for William J. Igoe Printing Co., to Kalman Steel Co.

CHICAGO, 256 tons of rail steel, garage at Eleventh and State Streets, to Calumet Steel Co.

CHICAGO, 220 tons of rail steel, Cook County road work on Cicero Avenue; placed by Chicago Heights Coal Co., contractor, with Calumet Steel Co.

OAK PARK, ILL., 200 tons of rail steel, apartment building at Seventy-third Avenue and Lake Street, to Calumet Steel Co.

MARSHALL COUNTY, ILL., 100 tons of rail steel, County road work; placed by Mid-West Supply Co., contractor, with Calumet Steel Co.

SEATTLE, WASH., 300 tons, store and a building for Richfield Oil Co., to Pacific Coast Steel Co.

TACOMA, WASH., 100 tons, chemical plant, to Northwest Steel Rolling Mills.

LOS ANGELES, 180 tons, retaining wall for Riverside-Dayton viaduct, to unnamed interest.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 300 tons, Harlem River tunnel; George H. Flynn Corporation, general contractor.

CHICAGO, 3000 tons, five junior high schools taking 600 tons each; bids, which are on entire tonnage, taken last week.

CHICAGO, 2000 tons, building for General Electric Co., West Pershing Road and Ashland Avenue; Graham, Anderson, Probst & White, architects.

SAN FRANCISCO, 300 tons, power house for Great Western Power Co.; bids soon.

SACRAMENTO, CAL., 108 tons, paving in Sacramento County; bids Aug. 15.

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes...	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.60c.
Squares and flats.....	4.10c.
Bands	3.60c.
Hoops	4.00c. to 4.50c.
Black sheets (No. 24), 25 or more bundles	3.55c.
Galv. sheets (No. 24), 25 or more bundles	4.40c.
Blue ann'l'd sheets (No. 10), 25 or more sheets	3.10c.
Galv. corrug. sheets (No. 28), per square	\$4.31
Spikes, large.....	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 per cent off list	
Machine bolts, 100 count, 60 per cent off list	
Carriage bolts, 100 count, 60 per cent off list	
Nuts, all styles, 100 count, 60 per cent off list	
Large rivets, base per 100 lb.	\$3.50
Wire, black soft ann'l'd, base per 100 lb.	\$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and over.....	\$32.00 to \$33.00
Rerolling, under 4-in. to and including 1½-in.....	33.00 to 34.00
Forging, ordinary.....	38.00
Forging, guaranteed.....	43.00

Sheet Bars

	Per Gross Ton
Open-hearth or Bessemer.....	\$32.00 to \$33.00

Slabs

	Per Gross Ton
8 in. x 2 in. and larger.....	\$32.00 to \$33.00
Smaller than 8 in. x 2 in.....	33.00 to 34.00

Skelp

	Per Lb.
Grooved.....	1.85c. to 1.90c.
Sheared.....	1.85c. to 1.90c.
Universal.....	1.85c. to 1.90c.

Wire Rods

	Per Gross Ton
*Common soft, base.....	\$42.00
Screw stock.....	\$5.00 per ton over base

*Chicago mill base is \$43. Cleveland mill base, \$42.

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron.....	\$4.55
Old range non-Bessemer, 51.50% iron.....	4.40
Mesabi Bessemer, 51.50% iron.....	4.40
Mesabi non-Bessemer, 51.50% iron.....	4.25
High phosphorus, 51.50% iron.....	4.15
Foreign Ore, c.i.f. Philadelphia or Baltimore	Per Unit

Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria.....10.00c.

Iron ore, Swedish, average 66% iron, 9.25c. to 9.50c.

Manganese ore, washed, 52% manganese, from the Caucasus.....39c.

Manganese ore, Brazilian, African or Indian, basis 50%.....38c. to 39c.

Tungsten ore, high grade, per unit, in 60% concentrates.....\$11.00 to \$11.25

Chrome ore, 45 to 50% Cr₂O₃, crude, c.i.f. Atlantic seaboard.....\$22.00 to \$24.00

Molybdenum ore, 85% concentrates of MoS₂, delivered.....50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt.....	\$2.75
Foundry, f.o.b. Connellsville prompt.....	\$3.50 to 4.25
Foundry, by-product, Ch'go ovens.....	8.00
Foundry, by-product, New England, del'd.....	11.00
Foundry, by-product, Newark or Jersey city, delivered.....	9.00 to 9.40
Foundry, Birmingham.....	5.00
Foundry, by-products, St. Louis, f.o.b. ovens.....	8.00
Foundry by-prod., del'd St. Louis.....	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines.....	\$1.40 to \$1.80
Mine run coking coal, f.o.b. W. Pa. mines.....	1.50 to 1.75
Gas coal, ¾-in., f.o.b. Pa. mines.....	2.00 to 2.10
Mine run gas coal, f.o.b. Pa. mines.....	1.75 to 1.90
Steam slack, f.o.b. W. Pa. mines.....	1.00 to 1.05
Gas slack, f.o.b. W. Pa. mines.....	1.10 to 1.15

Ferromanganese

	Per Gross Ton
Domestic, 80%, furnace or seab'd.....	\$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid.....	105.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%.....	\$31.00 to \$32.00
Domestic, 16 to 19%.....	29.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%.....	\$33.50 to \$38.50
75%.....	130.00 to 140.00
	Per Gross Ton Furnace
10%.....	\$35.00
11%.....	37.00
	Per Gross Ton Furnace
12%.....	\$39.00
14 to 16%.....	45.00

Bessemer Ferrosilicon

	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace.....	
10%.....	\$30.00
11%.....	32.00
	Per Gross Ton
12%.....	\$34.00

Silvery Iron

	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace.....	
6%.....	\$23.00
7%.....	24.00
8%.....	25.00
9%.....	26.00
	Per Gross Ton
10%.....	\$28.00
11%.....	30.00
12%.....	32.00

Other Ferroalloys

Ferrotungsten, per lb. contained metal, del'd.....	95c.
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads.....	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace.....	\$3.15 to \$3.65
Ferrocobalt, 15 to 18%, per net ton, f.o.b. furnace, in carloads.....	\$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton.....	\$91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton.....	\$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines.....	\$17.00
No. 2 lump, Illinois and Kentucky mines.....	\$18.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid.....	\$16.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines.....	\$32.50

Fire Clay

	Per 1000 f.o.b. Works	
	First Quality	Second Quality
Pennsylvania ..	\$43.00 to \$46.00	\$35.00 to \$38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey.....	50.00 to 65.00	—————
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton.....	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania.....	\$43.00
Chicago.....	52.00
Birmingham.....	50.00
Silica clay, per ton.....	\$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.....	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.....	40.00

Chrome Brick

	Per Net Ton
Standard size.....	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

†Machine bolts.....	70
†Carriage bolts.....	70
Lag bolts.....	70
Plow bolts, Nos. 1, 2, 3 and 7 heads.....	70
Hot-pressed nuts, blank or tapped, square.....	70
Hot-pressed nuts, blank or tapped, hexagons.....	70
C.p.c. and t. square or hex. nuts, blank or tapped.....	70
Washers*.....	.675c. to 6.50c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ¾ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List

Semi-finished hexagon nuts.....	70
Semi-finished hexagon castellated nuts, S.A.E.....	70
Stove bolts in packages, Pittsburgh.....	80, 10 and 2½
Stove bolts in bulk, Chicago.....	75, 20, 10 and 5
Stove bolts in bulk, Pittsburgh.....	80, 10 and 5
Stove bolts in bulk, Chicago.....	75, 20, 10, 5 and 2½
Tire bolts.....	.60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55 to 60 per cent apply.

Large Rivets

(½-In. and Larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland.....	\$2.90
F.o.b. Chicago.....	3.00

Small Rivets

(½-In. and Smaller)

Per Cent Off List

F.o.b. Pittsburgh.....	70 and 10
F.o.b. Cleveland.....	70 and 10
F.o.b. Chicago.....	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws.....	80, 10 and 10
Milled standard set screws, case hardened.....	80 and 10
Milled headless set screws, cut threads.....	80
Upset hex. head cap screws, U.S.S. thread.....	85 and 5
Upset hex. cap screws, S.A.E. thread.....	85 and 5
Upset set screws.....	80, 10 and 10
Milled studs.....	70 and 5

Chicago

Steel Mill Backlogs Gained Slightly in July—Ingot Output 75 Per Cent With Outlook More Favorable

CHICAGO, July 31.—In contrast with a year ago, steel mill backlogs gained a trifle in July. The net result is that both new business and shipments of finished steel products in the seventh month of this year established a record over the corresponding periods in former years. The rate of specifying as August starts has not decreased and the belief is common that August will be better than the average summer month. Sales in the past week were equal to the average so far this year, showing marked improvement over the previous seven-day period. The bulk of this business is in bar mill products that are being directed principally to the manufacturers of automobiles and accessories.

Cold-drawn bar makers are taking larger quantities and railroads find heavier needs as they sustain car repair and rebuilding programs that are more extensive than is common at this time of the year. Manufacturers of welded pipe are pressing for deliveries and oil storage tank programs are of greater moment, bringing to this market plate business that is urgently needed in the absence of normal railroad equipment construction.

The No. 2 furnace at Gary was taken out of service July 28, bringing the count of active Steel Corporation stacks to 16 out of 27 in this district. In the meantime, ingot output remains at 75 per cent of capacity and the outlook is a trifle more favorable than a week ago that this rate will be maintained.

Sheets are moving in better volume and sales are more numerous at present quotations.

Both jobbing and contract foundries in this territory have taken on additional work and are in need of heavier shipments of pig iron. Sales, about one-half of which are for the third quarter and the remainder for the next five months, aggregate 30,000 tons in one of the most active buying periods since before the turn of this quarter.

Pig Iron.—Numerous sales of 500 to 3000 tons each mark this as an unusually active week in northern Illinois and southern Wisconsin. July sales were in excess of those in either July, 1926, or July, 1927, and purchases for the first seven months in 1928 are substantially ahead of the corresponding period in 1927. The foundry melt has grown measurably in the last 10 days, this being equally true of jobbing and contract shops. Production in the Chicago district remains steady and sellers continue to reduce stocks. The Cadillac furnace, a producer of charcoal iron, has been blown out.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25..	\$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75..	18.00
Malleable, not over 2.25 sil.....	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50.....	27.04
So'th'n No. 2 fdy. (all rail).....	21.51
So'th'n No. 2 (barge and rail).....	21.01
Low phos., sil. 1 to 2, copper free	\$28.50 to 29.00
Silvery, sil. 8 per cent.....	29.79
Bess. ferrosilicon, 14-15%.....	46.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—A sale of 1000 tons of 19 to 21 per cent spiegeleisen is reported at St. Louis at \$31, Hazard, Pa. In the local market, this commodity is quiet. A Chicago steel mill user is making inquiry as to the possibility of bringing 3000 tons of ferromanganese by boat from Europe to Chicago.

Prices delivered Chicago: 80 per cent ferromanganese, \$112.56; 50 per cent ferrosilicon, \$83.50 to \$87.50; spiegeleisen, 19 to 21 per cent, \$40.76.

Structural Material.—Although new business and that in prospect are of good size, contractors predict that the early fall will see a marked recession in large building activities in the Chicago area. Fabricators are already beginning to complain about conditions, though it is more on account of small backlogs than because of lack of work in shops at the beginning of the new month. Structural orders for the week total more than 7000 tons. A St. Louis shop will fabricate 1500 tons for an express building in that city. The Apparel Mart, Chicago, which is still in the stage of being financed, is now said to require between 50,000 and 60,000 tons of steel. Following the formation of the Colgate-Palmolive-Peet combination, an enlargement of the Palmolive-Peet Building in Chicago has been ordered. Over 3000 tons has been added, bringing the total order to 7000 tons of structural steel. Among old inquiries that are being revived is 15,000 tons for the Chicago Board of Trade Building.

Mill prices on plain material, per lb.: 2c., base, Chicago.

Plates.—Of special importance to the local plate market are three orders for tank materials totaling over 7000 tons. This steel is for fabrication and erection in the Southwest. Definite action has not been taken on 12,000 tons sought by the Texas & Pacific Oil Co., but local sellers expect that orders will be placed in the next few days. The Humble Oil & Refining Co. may soon come into the market for a large tonnage of tankage materials and other oil companies are said to be contemplating similar action. All told, steel demand from the Southern and Southwestern oil fields promises well for August. Manufacturers of welded pipe are unusually busy and are pressing mills for weekly deliveries in excess of the tonnage scheduled at the time contracts were placed. Reports are insistent that railroad equipment purchases will be-

come larger and more numerous in the late summer and early fall. Orders this week include 100 automobile cars for the Chicago & Eastern Illinois and 100 underframes for the Fruit Growers' Express. Noteworthy among fresh inquiries is one for 500 gondola car bodies for the Chesapeake & Ohio and another for 100 automobile cars for the Missouri Pacific. Railroad repair programs are fully up to schedules in previous summers, as shown by specifications from that source. General demand for plates is surprisingly broad, and the total tonnage being ordered out clearly shows that the seasonal drop in shipments is less than a year ago, in spite of the fact that car shops are in need of little material. Deliveries average about three weeks and prices are steady at 2c., Chicago.

Mill prices on plates, per lb.: 2c., base Chicago.

Bars.—Users in practically all lines are making heavy demands for soft steel bars, with the result that a sharp increase is noticed both in new buying and specifications. While a few sales represent needs to finish out the third quarter, the bulk of new business is at close range. The total volume of specifications is above production at the moment. Individual releases are small and call attention to the fact that, while demand is widespread and above expectations, the attitude of buyers is conservative. Automobile manufacturers are still the most prominent among users of bar mill products. It is the steadiness of this industry that largely accounts for the largest July bar shipments in four years. Backlogs have grown a trifle and deliveries range from three to four weeks. Although iron bar mills are far from fully engaged, current orders at 2c. and specifications are considered satisfactory for this time of year. Shipments of alloy bars are but a reflection of the continued activity among manufacturers of automobiles. Prices and alloy differentials are steady. Shipments of rail steel bars do not match with production, thus affording producers an opportunity to build stocks against needs for reinforcing bars and fence posts. Contracts are on the basis of 1.85c., Chicago Heights, whereas small miscellaneous orders are being taken at 1.90c.

Mill prices per lb.: Soft steel bars, 2c., base, Chicago; common bar iron, 2c., base, Chicago; rail steel bars, 1.85c., base, Chicago Heights mill.

Reinforcing Bars.—Lettings are light, but an unusually large amount of business is pending and in prospect. July has been the leading month in 1928 in the number of quotations made on reinforcing work, and likewise the past seven days have seen the most active quoting of any week so far this year. Bending shops are still operating at 75 to 80 per cent of capacity. Recent lettings and inquiries are shown on page 308.

Sheets.—An upturn in operations is following closely on a larger volume of orders and specifications. Buyers

are now giving evidence that they wish to take advantage of the present low prices and that they are not willing to allow stocks to run to lower levels. The bulk of purchases are for 60 days and some inquiry has been made as to the attitude that producers will assume in booking business beyond the end of this quarter. Output stands close to 70 per cent of hot mill capacity.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.80c.; No. 24 galv., 3.65c.; No. 10 blue ann'd, 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than Chgo. deliv'd prices.

Rails and Track Supplies.—Local rail mills have been able to hold operations above expectations as result of a steady number of new small orders and additional releases against optional tonnages. Fresh inquiry for standard-section rails totals 2000 tons in miscellaneous lots. Sales of light rails in July were of good size when compared with the demand for this product in some previous months. New sales in track fastenings total 1500 tons, and specifications, which are larger, assure the maintenance of the rate of operations which has been adhered to during the past 30 days. A lot of iron tie plates has been taken at \$43 a ton, Chicago.

Prices f.o.b. mill, per gross ton: Standard-section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Bolts, Nuts and Rivets.—Specifications are steady and output ranges between 60 and 65 per. cent of capacity. Users who are not covered by contracts are entering the market more freely and spot sales on makers' books represent close to 25 per cent of total orders. Prices are firm.

Coke.—By-product foundry coke is moving more rapidly against second half contracts, this being a reflection of the greater activity among foundries. Prices are steady at \$8, f.o.b. local furnaces.

Old Material.—Purchases of heavy melting steel and cast iron borings have brought prices 25c. above the levels of a week ago. Quotations for

most grades appear steady in the face of a greater number of small purchases by a wider circle of buyers. One of the local steel mills has taken heavy melting steel at \$13 a gross ton, delivered, while two users of borings each have ordered 500 tons at \$9.75. That an oversupply of scrap exists in this district is shown by the fact that rejections are unusually frequent and dealers are seeking outlets at Lake Erie ports. Although there may be an outward flow of scrap by water routes, it is probable that the Detroit district will furnish Chicago with certain grades by the same means of transportation. A dealer has paid at Indianapolis \$12.25 a gross ton, delivered Gary, for a round tonnage of heavy melting steel. The Chicago & North Western will sell 6000 tons and the Santa Fe is offering 8000 tons.

Prices deliv'd consumers' yards, Chicago:

Per Gross Ton	
Basic Open-Hearth Grades:	
Heavy melting steel.....	\$12.50 to \$13.00
Shoveling steel.....	12.50 to 13.00
Frogs, switches and guards, cut apart, and misc. rails	13.50 to 14.00
Hydraul. compressed sheets	11.00 to 11.50
Drop forge flashings.....	9.50 to 10.00
Forg'd, cast and r'd steel carwheels.....	15.50 to 16.00
Railr'd tires, charg. box size.....	15.50 to 16.00
Railr'd leaf springs, cut apart.....	15.50 to 16.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	13.75 to 14.25
Coll springs.....	15.75 to 16.25
Electric Furnace Grades:	
Axle turnings.....	12.50 to 13.00
Low phos. punchings.....	14.00 to 14.50
Low phos. plate, 12 in. and under.....	14.00 to 14.50
Blast Furnace Grades:	
Axle turnings.....	9.50 to 10.00
Cast iron borings.....	9.25 to 9.75
Short shoveling turnings.....	9.00 to 9.50
Machine shop turnings.....	6.00 to 6.50
Rolling Mill Grades:	
Iron rails.....	13.50 to 14.00
Rerolling rails.....	14.75 to 15.25
Cupola Grades:	
Steel rails less than 3 ft.....	15.25 to 15.75
Angle bars, steel.....	14.25 to 14.75
Cast iron carwheels.....	12.75 to 13.00
Malleable Grades:	
Railroad.....	12.50 to 13.00
Agricultural.....	11.50 to 12.00
Miscellaneous:	
*Relay'g rails, 56 to 60 lb.	23.00 to 25.00
*Relay'g rails, 65 lb. and heav.....	26.00 to 31.00

Per Net Ton	
Rolling Mill Grades:	
Iron angles and splice bars	13.50 to 14.00
Iron arch bars and transoms.....	19.50 to 20.00
Iron car axles.....	24.00 to 24.50
Steel car axles.....	15.50 to 16.00
No. 1 railroad wrought.....	10.75 to 11.25
No. 2 railroad wrought.....	11.00 to 11.50
No. 1 busheling.....	9.50 to 10.00
No. 2 busheling.....	5.75 to 6.25
Locomotive tires, smooth.....	12.00 to 12.50
Pipes and flues.....	8.00 to 8.50
Cupola Grades:	
No. 1 machinery cast.....	13.50 to 14.00
No. 1 railroad cast.....	12.75 to 13.25
No. 1 agricultural cast.....	12.50 to 13.00
Stove plate.....	10.75 to 11.25
Grate bars.....	11.25 to 11.75
Brake shoes.....	10.00 to 10.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Wire Products.—Although July sales and production both dropped a trifle below the June totals, it is significant that July was unusually good. This can be accounted for in large measure by the uniform demand from the manufacturing trade because distribution in the farm areas has been cut during the time of intensive work in the fields. Demand for nails is

taking a turn for the better, but it is still far below the expectations of sellers during this, the active building season. Prices for wire nails are \$2.60, base, per keg, Chicago. Quotations on plain wire are steady at \$2.45 per 100 lb.

Cast Iron Pipe.—James B. Clow & Sons have taken 950 tons of 8-in. and 75 tons of 12-in. pipe for Milwaukee at \$42.24, delivered, or \$33.74, Birmingham. Contractors, having completed much of the work given them earlier in the year, are looking for fresh contracts and the prices they are bidding are lower than they were a month or six weeks ago. Fresh inquiry is not large and producers foresee a less active summer than in some of the past years. Springfield, Ill., will buy 700 tons of 10 and 16-in. class C and 36-in. class A pipe. The inquiry by St. Clair Shores, Mich., for 2200 tons, is still open. Railroads are taking cast iron in limited quantities and public utilities are finding a normal midsummer use for this commodity.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$42.20 to \$43.20; 4-in., \$46.20 to \$47.20; Class A and gas pipe, \$4 extra.

RAILROAD EQUIPMENT

New York Central Inquires for 55 Locomotives

THE New York Central's inquiry for 55 locomotives is the feature of the week's equipment market. An additional 13 locomotives are also wanted for export. The Chesapeake & Ohio will purchase 500 gondola car bodies. Buying has been light, the only sizable order having been placed by the Chicago & Eastern Illinois for 100 automobile cars. Details of the week's business follow:

Chesapeake & Ohio has made inquiry for 500 70-ton hopper-bottom gondola car bodies and repairs to trucks.

Seaboard Air Line is said to have definitely withdrawn its recent inquiry for 1000 box cars.

Chicago, Rock Island & Pacific has placed 10 air-dump cars with Western Wheeled Scraper Co.

Chicago & Eastern Illinois has purchased 100 40-ton automobile cars from Mount Vernon Car Mfg. Co.

Cincinnati, Hamilton & Dayton has ordered 10 ballast cars from American Car & Foundry Co.

Fruit Growers Express has ordered 100 steel underframes for refrigerator cars from Pressed Steel Car Co.

Southern Pacific is inquiring for four gas-electric rail motor cars.

Chilean State Railways have made inquiry for 20 coaches and six sleeping cars. Bids will be received Nov. 23.

Buenos Aires & Pacific, Argentina, is inquiring for eight Mikado type locomotives.

F. C. Cochabamba, Santa Cruz, Bolivia, has ordered two Mikado type locomotives from American Locomotive Co.

Hu Len Hel Hun, China, is inquiring for five Mikado type locomotives.

New York Central is inquiring for 25 locomotives, type 4-8-2, and 30 locomotives, type 4-6-4.

Northern Illinois Coal Corporation has purchased six air-dump cars from Koppel Industrial Car & Equipment Co.

Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforc'g bars, billet steel.....	2.30c. to 3.00c.
Reinforc'g bars, hard steel.....	2.00c. to 2.70c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands.....	3.65c.
Hoops.....	4.15c.
Black sheets (No. 24).....	3.90c.
Galv. sheets (No. 24).....	4.65c.
Blue ann'd sheets (No. 10).....	3.35c.
Spikes, stand. railroad.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	3.60c.
Rivets, boiler.....	3.60c.
Per Cent Off List	
Machine bolts.....	60
Carriage bolts.....	60
Coach or lag screws.....	60
Hot-pressed nuts, sq. tap, or blank.....	60
Hot-pressed nuts, hex., tap, or blank.....	60
No. 8 black ann'd wire, per 100 lb.....	\$3.30
Com. wire nails, base per keg.....	3.10
Cement c'd nails, base per keg.....	3.10

Philadelphia

Basic Pig Iron Declines Slightly on 20,000-Ton Purchase— Steel Prices Strengthening

PHILADELPHIA, July 31.—Orders for steel have registered a slight decline in the past week, but the total for the entire month is reported by most mills to have been quite satisfactory. Sellers are showing considerable determination in their effort to advance prices to 2.05c., Coatesville, on plates, 1.90c., Pittsburgh, on bars, and 2.05c., Bethlehem, on shapes. Sheet mills are also seeking to eliminate the tendency to weakness in prices and are beginning to offer more resistance to concessions. Shape prices are still unstable and on a lower level than quotations on plates or bars, with the market ranging from 1.95c., Pencoyd, Pa., to 2c., Bethlehem. On a purchase of 20,000 tons of basic pig iron by an Eastern steel company, the price declined 25c. a ton.

Pig Iron.—An eastern Pennsylvania consumer of basic iron, which has been inquiring for about 20,000 tons, has bought. Based on this and another recent purchase, basic iron is quotable at \$18.75 to \$19.25 per ton, delivered. Among recent inquiries for the foundry grade are a number of lots for the United States Navy, including about 400 tons for Puget Sound, and about a carload each for the navy yards at Portsmouth, Brooklyn and Philadelphia. The Baldwin Locomotive Works, Eddystone, Pa., is inquiring for 1500 to 2000 tons of cylinder iron, about 1.40 per cent silicon content, and the New York Air Brake Co., Watertown, N. Y., is in the market for about 100 tons of silvery iron. The present price of \$19.50 per ton, base furnace, on the foundry grade is apparently being maintained on current orders, which are composed principally of small lots. Sellers in this district report that some small tonnages of Buffalo iron are arriving for consumers in this territory.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$20.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.76
East. Pa. No. 1X.	21.26
Basic (del'd east. Pa.)	\$18.75 to \$19.25
Gray forge	19.75 to 20.25
Malleable	21.00 to 21.50
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to 23.50
Va. No. 2 plain, 1.75 to 2.25 sil.	24.54
Va. No. 2X, 2.25 to 2.75 sil.	25.04

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Ferromanganese.—Buying is mostly of one or two carloads, on which the market price of \$105 per ton, seaboard, applies. Sellers report that the Ford Motor Co., recently in the market for about 1000 tons of ferromanganese for its Fordson plant, claims to have been able to buy at less than the quoted price for second half of \$105 per ton, seaboard, but no intimation of the extent of the concession was given by the buyer.

Bars.—Except for a slight decline in buying during the last week of the month, there has been an active market throughout July. Mills are endeavoring to obtain 1.90c., Pittsburgh, or 2.22c., Philadelphia, on all new busi-

ness, but there are many uncompleted contracts at 1.85c., Pittsburgh.

Plates.—Mills are succeeding in obtaining 2.05c., Coatesville, or 2.15c., Philadelphia, on much of the current small-lot business, but on larger tonnages 2c., Coatesville, or 2.10c., Philadelphia, is not uncommon. Except for a slight decline in orders toward the end of the month, business in July has been quite satisfactory for most sellers.

Shapes.—Efforts to advance the market to the level of plates and bars have not as yet met with much success. The maker at Pencoyd, Pa., has been quoting 1.95c. to 2c. per lb., Pencoyd, or 2.01c. to 2.06c., Philadelphia, and other mills have been meeting this price. As a result, Pencoyd has become, at least temporarily, a more usual basing point for shape prices than Bethlehem. Small tonnages occasionally bring up to 2c., Bethlehem, or 2.13c., Philadelphia, but the usual range of quotations seems to be 2.01c. to 2.08c., Philadelphia, based on 1.95c., Pencoyd, and 1.95c., Bethlehem. Fabricators are bidding on a number of projects in this territory, including highway bridges in Philadelphia, a high school at Pleasantville, N. J., dormitories at Princeton University and a factory building at Camden, N. J.

Sheets.—Concessions have not en-

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c. to 2.60c.
Plates, ⅝-in.	2.80c. to 3.00c.
Structural shapes	2.40c. to 2.60c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforce. steel bars, sq. twisted and deform.	2.50c. to 3.00c.
Cold-fin. steel, rounds and hex.	3.35c.
Cold-fin. steel, sq. and flats	3.85c.
Steel hoops	3.50c.
Steel bands, No. 12 to ⅝-in., inclus.	3.25c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.85c.
†Galvanized sheets (No. 24)	4.60c.
Blue ann'l'd sheets (No. 10)	3.15c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅝-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

tirely disappeared on black and galvanized sheets, but mills are evidently engaged in an earnest effort to maintain the market at 2.65c., Pittsburgh, or 2.97c., Philadelphia, for black and at 3.50c., Pittsburgh, or 3.82c., Philadelphia, for galvanized. Evidently prices \$1 a ton lower on black and \$2 lower on galvanized sheets are still obtainable by preferred buyers and distributors, but sellers are showing more resistance to efforts to obtain these concessions. Blue annealed sheets are fairly firm at 2c., Pittsburgh, or 2.32c., Philadelphia.

Warehouse Business.—Jobbers report a slightly smaller volume of business in the past week, but the total for the month has been satisfactory. Prices appear to be quite firm and in an effort to bring warehouse quotations more nearly in line with present mill prices, most jobbers are preparing to advance the base price of steel bars and small shapes within the next few days, probably to 2.70c. per lb. Quantity differentials are reported to be well maintained on all products.

Imports.—In the week ended July 28, 2000 tons of chrome ore arrived at this port from Portuguese Africa and 751 tons of pig iron came from India. Steel imports consisted of 524 tons of structural shapes and 12 tons of bars from Belgium and 19 tons of strip steel and four tons of steel scrap from the United Kingdom.

Old Material.—Prices of all grades are substantially unchanged. No. 1 heavy melting steel is still quoted at \$13 per ton, delivered eastern Pennsylvania mills, but a sizable tonnage has been bought at Sparrows Point, Md., for \$12.50 per ton, delivered. While a Coatesville, Pa., consumer is unwilling to pay more than \$14 per ton for occasional carloads of heavy breakable cast, a Harrisburg user has recently closed on some of this grade at \$14.50 per ton, delivered. Other consumers show little interest in making contracts.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$13.00
Scrap T rails	12.50
No. 2 heavy melting steel	\$10.50 to 11.00
No. 1 railroad wrought	13.50 to 14.50
Bundled sheets (for steel works)	9.50 to 10.00
Machine shop turnings (for steel works)	10.00 to 10.25
Heavy axle turnings (or equiv.)	12.00 to 13.00
Cast borings (for steel works and roll. mill)	10.00 to 10.50
Heavy breakable cast (for steel works)	14.00 to 15.00
Railroad grate bars	11.00 to 11.50
Stove plate (for steel works)	10.50 to 11.00
No. 1 low phos., hvy., 0.04% and under	17.50 to 18.00
Couplers and knuckles	14.50 to 15.00
Rolled steel wheels	14.50 to 15.00
No. 1 blast f'nace scrap	9.50 to 10.00
Wrot. iron and soft steel pipes and tubes (new specific.)	12.00 to 12.50
Shafting	16.50 to 17.00
Steel axles	19.00 to 20.00
No. 1 forge fire	11.00
Cast iron carwheels	15.50
No. 1 cast	15.50 to 16.00
Cast borings (for chem. plant)	14.50 to 15.00
Steel rails for rolling	14.50 to 15.00

New York

July Lettings of Structural Steel Bulk Large— Improvement in Pig Iron Inquiry

NEW YORK, July 31.—Increasing interest of buyers in their fall requirements has been the feature of the pig iron market in the last week, new inquiry being estimated at from 10,000 to 12,000 tons. Including business which had already been quoted on, fully 15,000 tons is now pending in the territory served by New York selling offices and action is still awaited on about 3000 tons of ballast iron for shipment to the Pacific Coast. A large consumer of malleable iron has come into the market for 6000 tons for delivery during August, September and October to its plants at Bridgeport, Union City and New Britain, Conn.; Troy, N. Y., and Wilmington, Del., and a radiator manufacturer will purchase 1400 tons of foundry iron for delivery during the third and fourth quarters at Norwich, Conn. Another New England melter is in the market for 1000 tons and a New Jersey melter is inquiring for a like quantity. The New York Air Brake Co. expects to buy 100 tons of silvery iron for Watertown, N. Y. A number of smaller inquiries for August and September requirements are before the trade and the first half of August is expected to bring out a substantial volume of fourth quarter business. Sales during the last week amounted possibly to 10,000 tons, the largest purchase, 2000 tons, for delivery over the remainder of the year. The A. P. Smith Mfg. Co., East Orange, N. J., is said to have closed for 750 tons of No. 2 plain and No. 2X for fourth quarter delivery and has made inquiry for an additional 100 tons of special iron for mixture purposes. Other sales have been principally in small tonnages, but have been well distributed, indicating, as does the steady rate of shipments against old contracts, that foundry operations are being well sustained. Buffalo foundry iron is still quotable at \$16 to \$17, furnace, but there have been sales, both in New England and in the New York district, in which the silicon differential has been waived. It is reported that the barge rate from Buffalo to New York is soon to be advanced 50c. a ton, and this promises a heavier movement of iron during the next few weeks, both for immediate consumption and for storage against requirements during the late fall. Eastern Pennsylvania producers are quoting \$19.50, furnace, for the base grade, but at that level are not able to compete with Buffalo barge iron.

Prices per gross ton, deliv'd New York district:

Buffalo No. 2 fdy., sil.	1.75
to 2.25	\$19.51 to \$20.01
East. Pa. No. 2 fdy., sil.	1.75 to 2.25
to 2.25	20.89 to 22.02
East. Pa. No. 2X fdy., sil.	2.25 to 2.75
to 2.75	21.39 to 22.52
East. Pa. No. 1X fdy., sil.	2.75 to 3.25
to 3.25	21.89 to 23.02

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

Plates, Shapes and Bars.—Structural steel lettings and inquiries in large volume continue to feature business in the heavy tonnage products. July awards of building work were large and prospects are encouraging for the rest of the summer. An award of 9500 tons for New York

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	5.15c. to 5.40c.
Hoops.....	4.50c.
Bands.....	4.00c.
Blue ann'l'd sheets (No. 10).....	3.85c. to 3.90c.
Long terme sheets (No. 24).....	5.60c. to 5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, 1½ x ½ in. and larger.....	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger.....	3.65c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.
Machine bolts, cut thread:	Per Cent Off List
¾ x 6 in. and smaller.....	55 to 60
1 x 30 in. and smaller.....	50 to 50 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	55 to 60
¾ x 20 in. and smaller.....	50 to 50 and 10
Coach screws:	
¾ x 6 in. and smaller.....	55 to 60
1 x 16 in. and smaller.....	50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.....	\$17.33
Seamless steel, 2-in.....	20.24
Charcoal iron, 2-in.....	25.00
Charcoal iron, 4-in.....	67.00
Discount on Welded Pipe	
Standard Steel—	Black Galv.
¾-in. butt.....	46 29
¾-in. butt.....	51 37
1-3-in. butt.....	53 39
2½-6-in. lap.....	48 35
7 and 8-in. lap.....	44 17
11 and 12-in. lap.....	37 12
Wrought Iron—	
¾-in. butt.....	5 +19
¾-in. butt.....	11 +9
1-1½-in. butt.....	14 +6
2-in. lap.....	5 +14
3-6-in. lap.....	11 +6
7-12-in. lap.....	3 +16
Tin Plate (14 x 20 in.)	
	Prime Seconds
Coke, 100 lb. base box.....	\$6.45 \$6.20
Charcoal, per Box—	A AAA
IC.....	\$9.70 \$12.10
IX.....	12.00 14.25
IXX.....	13.90 16.00
Terne Plate (14 x 20 in.)	
IC—20-lb. coating.....	\$10.00 to \$11.00
IC—30-lb. coating.....	12.00 to 13.00
IC—40-lb. coating.....	13.75 to 14.25
Sheets, Box Annealed—Black, C. R.	
	One Pass Per Lb.
Nos. 18 to 20.....	3.60c. to 3.80c.
No. 22.....	3.75c. to 3.95c.
No. 24.....	3.80c. to 4.00c.
No. 26.....	3.90c. to 4.10c.
No. 28*	4.05c. to 4.25c.
No. 30.....	4.30c. to 4.50c.
Sheets, Galvanized	
	Per Lb.
No. 14.....	4.15c. to 4.35c.
No. 16.....	4.00c. to 4.20c.
No. 18.....	4.15c. to 4.35c.
No. 20.....	4.30c. to 4.50c.
No. 22.....	4.35c. to 4.55c.
No. 24.....	4.50c. to 4.70c.
No. 26.....	4.75c. to 4.95c.
No. 28*	5.00c. to 5.20c.
No. 30.....	5.40c. to 5.60c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

subway work probably will be made this week. Outstanding among the inquiries is 18,000 tons for the new Reynolds Building, Forty-second Street and Lexington Avenue, which will be higher than the Woolworth Building. Another large building to be built at 1 Wall Street by the American Exchange-Trust Co. will take about 15,000 tons. The dullness in the railroad equipment field continues, there being but one important inquiry and that is for 500 gondola car bodies and repairs to 500 trucks from the Chesapeake & Ohio. Prices on plates, shapes and bars are unchanged, but the tendency toward 1.90c., Pittsburgh, on bars is stronger and several fair-sized lots have been sold at that price. On plates, 2c., Coatesville, is the ruling price, while on shapes the mills are getting 2c., Bethlehem, with \$1 higher on both products in small lots. The demand for universal plates is exceptionally active, and one Eastern mill is unable to make better deliveries than three weeks, although shipments in a week to 10 days can be made of the sheared mill products.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.19c. to 2.24c.; plates 2.12½c. to 2.22½c.; struct. shapes, 2.14½c. to 2.19½c.; bar iron, 2.14c.

Sheets.—Notwithstanding efforts of several of the larger manufacturers of sheets to stiffen prices, some of the recent low quotations have not disappeared. Sales of galvanized sheets have been made at 3.30c. and 3.35c., but the more common quotation is 3.40c., with some makers asking 3.50c. Black sheets range from 2.60c. to 2.65c., Pittsburgh; some makers will not go below 2.65c., but on competitive business of an attractive character the buyer has little difficulty in getting 2.60c. Blue annealed sheets are fairly steady at 2c., but there are occasional sales at \$1 or \$2 a ton less.

Pipe.—An American mill has taken an order for more than 1000 tons of oil well casing for shipment to the Venezuelan oil fields, and the American representative of a German maker booked about 500 tons from the same buyer.

Cast Iron Pipe.—There is a fair volume of private purchasing of pressure pipe, but very little municipal inquiry. Southern makers continue fairly firm at \$34 to \$35 per ton, base Birmingham, which is not competitive in this district with Northern foundries maintaining from \$37.60 to \$38.60 per ton, delivered New York. Most of the recent buying has been confined to small lots to complete installations.

Prices per net ton, deliv'd New York: Water pipe 6-in. and larger, \$37.60 to \$38.60; 4-in. and 5-in., \$42.60 to \$43.60; 3-in., \$52.60 to \$53.60; Class A and gas pipe, \$4 to \$5 extra.

Reinforcing Bars.—The McClintic-Marshall Co. will furnish 1800 tons of bars for a bridge at Providence, R. I., and the Concrete Steel Co. has booked 1200 tons for a railroad warehouse in New York. The run of small orders has kept up at about the rate of recent weeks. The Gibbs Rice Co., Inc., New York, is low bidder on a

high school at White Plains, N. Y., which will require about 500 tons, and 300 tons will be needed for a tunnel under the Harlem River, on which the George H. Flynn Corporation is general contractor. Effective Aug. 1, distributors in this territory will not ship cut-to-length from mills, except in 40, 50 and 60-ft. lengths. At the same time a warehouse price of 2.15c. per lb., Pittsburgh, has been announced, making a delivered price on cars at New York of 2.49c. This compares with the old Youngstown warehouse price of 2.20c., or 2.57½c. on cars at New York. New York warehouse prices are unchanged.

Warehouse Business.—Orders have been slightly smaller since about the middle of the month, but most jobbers estimate that the total business for July will equal or be slightly in excess of that in June. Black and galvanized sheet prices continue at about 3.80c. per lb., base, for black and 4.50c., base, for galvanized in the metropolitan district with quotations in local New Jersey about 20c. per 100 lb. higher. There has been no change in discounts on machine bolts and coach screws, but in most cases warehouses are offering 60 per cent off list, even for small lots, rather than quote a range of 55 to 60 per cent off.

Coke.—Specifications on foundry coke contracts are good, indicating good seasonal foundry operations, but new sales are few. Foundry coke is unchanged at \$3.50 per net ton, Connellsville, and the furnace grade is quoted at \$2.50 to \$2.75. Special brands of foundry coke are offered at \$4.85, f.o.b. ovens, and delivered prices are \$8.56 per net ton to northern New Jersey, Jersey City and New-

ark and \$9.44 to New York and Brooklyn. By-product foundry coke is unchanged at \$9 to \$9.40, Newark or Jersey City, and \$10.06 to \$10.29, New York or Brooklyn.

Old Material.—Dealers report a slightly smaller tonnage of scrap offered at present prices, but no scarcity of material seems to be in prospect. Prices on all grades show practically no change, except that on the basis of a recent sale of heavy breakable cast to a Coatesville, Pa., consumer, dealers are offering \$13.50 per ton, delivered, while others are quoting \$14 per ton, delivered to a Harrisburg, Pa., mill. No. 1 heavy melting steel has been bought by the consumer at Sparrows Point, Md., at \$12.50 per ton, delivered. Bids on the list of the Pennsylvania Railroad, offering about 40,000 tons, are to be opened this week.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel.	\$9.00 to \$9.85
Heavy melting steel (yard)	6.00 to 6.25
No. 1 hvy. breakable cast.	9.75 to 10.00
Stove plate (steel works)...	6.75 to 7.25
Locomotive grate bars....	6.75 to 7.25
Machine shop turnings....	6.00 to 6.50
Short shoveling turnings....	6.00 to 6.50
Cast borings (blast furn. or steel works).....	6.00 to 6.50
Mixed borings and turnings.....	6.00 to 6.50
Steel car axles.....	14.50 to 15.00
Iron car axles.....	23.50 to 24.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	8.25 to 8.75
Forge fire.....	6.50 to 6.75
No. 1 railroad wrought....	9.00 to 9.50
No. 1 yard wrot., long....	7.50 to 8.00
Rails for rolling.....	10.00 to 10.50
Cast iron carwheels.....	11.00 to 11.50
Stove plate (foundry)....	8.25 to 8.75
Malleable cast (railroad)....	10.00
Cast borings (chemical)....	10.75 to 11.25

Prices per gross ton, deliv'd local foundries:

No. 1 machy. cast.....	\$14.00 to \$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size.....	12.00 to 13.00
No. 2 cast (radiators, cast boilers, etc.).....	11.50 to 12.50

menting on the fact that the movement of iron to consumers is better than usual for this time of the year. Shipments in July were slightly larger than those in June and exceeded output. In fact, stocks on hand at district furnaces have been cut down considerably. Sales in the past week by Cleveland interests totaled approximately 40,000 tons, an increase of about 14,000 tons over the previous week. Pending business is of fair volume, the most important inquiry calling for 3200 tons of foundry iron for delivery over the remainder of the year to an Indiana consumer. As a result of the improvement in buying and of shipments, prices have assumed a firmer tone, although no actual changes have occurred. In Michigan, a larger number of orders have been booked at \$18, although the bulk of the tonnage is still being taken at \$17.50. For delivery to highly competitive points a strengthening of quotations is reported, the minimum price now being \$16.25, furnace.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25.....	\$18.00
S'th'n fdy., sil. 1.75 to 2.25.....	21.50
Malleable.....	18.00
Ohio silvery, 8 per cent.....	28.00
Basic Valley furnace.....	16.00
Stand. low phos., Valley furn.....	26.50

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Warehouse Business.—Local jobbers have announced a reduction on galvanized and black sheets of \$3 and \$7 a ton respectively, the new schedule to become effective immediately. Otherwise, prices are being well maintained. The volume of business in the past week has been only moderate, but has been distributed among all products.

Sheets.—There has been a recession in fresh orders and in specifications during the past 10 days. The lull in buying is traceable largely to the slackened demand from the automobile industry. Many companies are bringing out new models, but will not get into sizable production for a short time and under the circumstances the release of more liberal specifications by companies in the automotive field probably will not materialize for a few weeks at least. Purchases by other consumers also have been light. The falling off in bookings has not affected prices, which are firmer. Black sheets are quoted at 2.65c., Valley, or 2.60c., Pittsburgh, while blue annealed stock ranges from 1.90c. to 2c., Pittsburgh, with most orders be-

Cleveland

July Steel Business Gains and Exceeds That of June—One Sheet Mill Advances Prices

CLEVELAND, July 31.—The last week of July has brought further improvement in bookings of heavy steel products, with the result that the volume of business in the past month exceeded that of June by a small percentage and that of July, 1927, by a comfortable margin. The betterment is reflected in an increasing tone of optimism which pervades the market. The general sentiment is that activities are being carried along at a rate somewhat above normal for midsummer and expectations are that the present liberal run of specifications and orders is a forerunner of a satisfactory movement of steel in the fall. The wide distribution of bookings among consuming industries is interpreted as an indication of well-sustained operations in many different lines.

While prices are showing a firmer tendency, bars, shapes and plates have by no means been established on a basis of 1.90c., Pittsburgh. A considerable number of current orders are being placed at that figure, but most contract customers are covered for this quarter at 1.85c., and in some cases contracts originally made at 1.90c. have been revised recently to the lower schedule. Plates still can be obtained at 1.85c., Pittsburgh, which is being rather widely quoted. Steel bars range from 1.85c. to 1.90c., Cleveland.

Almost without exception steel orders have called for small lots for immediate delivery. Building activities continue quiet, the only large jobs which have appeared being the new building for Lakeside Hospital, Cleveland, requiring 4000 tons of structural steel, and a structure in Detroit for the Bell Telephone Co., for which 1040 tons will be needed.

In pig iron the week was notable in that sales were the largest since early in April.

Pig Iron.—The situation is more encouraging to producers, who are com-

Warehouse Prices, f.o.b. Cleveland

Base per Lb.

Plates and struct. shapes.....	3.00c.
Soft steel bars.....	3.00c.
Reinforc. steel bars.....	2.25c. to 2.75c.
Cold-fin. rounds and hex.....	3.65c.
Cold-fin. flats and sq.....	4.15c.
Hoops and bands.....	3.65c.
Cold-finished strip.....	*5.95c.
Black sheets (No. 24).....	3.40c.
Galvanized sheets (No. 24).....	4.25c.
Blue ann'd sheets (No. 10).....	3.25c.
No. 9 ann'd wire, per 100 lb.....	\$2.85
No. 9 gal. wire, per 100 lb.....	3.30
Com. wire nails, base per keg.....	2.85

*Net base, including boxing and cutting to length.

ing placed at the lower figure. Galvanized sheets remain at 3.40c., Pittsburgh, and 3.45c., Valley. An important sheet maker has advanced black to 2.85c. and blue annealed to 2.10c., Pittsburgh, although in both cases it is offering pickled grades at \$2 a ton less.

Cold-Finished Steel Bars.—Mills are booking a moderate amount of business from companies in the automotive industry. The price is steady at 2.15c., Cleveland.

Strip Steel.—Consumers continue to specify rather meagerly against current contracts and fresh orders have been poor in volume. Quotations on hot-rolled strips average 1.75c., Pittsburgh, on wide material. Mills are reported to be selling cold-rolled strip at 2.65c., Cleveland, for 3 tons or more. Fender stock is unchanged at 4.10c.

Wire Products.—A slight improvement in buying is noticed, although current business reflects only a fair demand from consuming industries. Prices are showing signs of firmness.

Reinforcing Bars.—The Lakeside Hospital, this city, will require a considerable tonnage of bars, but the amount has not yet been computed. Rail steel bars are firm at 1.75c., mill.

Coke.—Consumers are accepting a fair amount of by-product foundry coke on present contracts, but forward buying is practically at a standstill, buyers preferring to confine orders to cover immediate needs only. Ohio by-product foundry coke is unchanged at \$7.75, Painesville, while Connellsville foundry coke remains at \$3.50 to \$4.85, ovens.

Semi-Finished Steel.—While forward buying of sheet bars is negligible, specifications on third quarter contracts have been satisfactory.

Quotations continue firm at \$32 to \$33, Cleveland, for sheet bars, billets and slabs.

Bolts, Nuts and Rivets.—Shipments to contract customers have been sustained at a fairly high level, a considerable percentage of the business having come from agricultural implement makers and from jobbers. Prices are steady and unchanged.

Old Material.—Steel plants have increased specifications against present contracts, so that the amount of material being shipped to consumers is of fair proportions. Local dealers are buying only enough tonnage to cover present contract obligations. Blast furnace grades are somewhat active, but foundry items are quiet. There is a good demand for machine shop turnings. Prices of several items have weakened, although quotations in general are fairly firm.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades		
No. 1 heavy melting steel.		\$13.00
No. 2 heavy melting steel.	\$12.25 to	12.50
Compressed sheet steel.	12.00 to	12.50
Light bundled sheet		
stamp'gs	11.50 to	11.75
Drop forge flashings.	11.25 to	11.50
Machine shop turnings.	7.00 to	7.25
No. 1 railroad wrought.	11.50 to	12.00
No. 2 railroad wrought.	13.50 to	13.75
No. 1 busheling.	10.50 to	11.00
Pipes and flues.	9.00 to	9.50
Steel axle turnings.	12.50 to	13.00
Acid Open-Hearth Grades		
Low phos. forging crops.	16.00 to	16.50
Low phos., billet, bloom		
and slab crops.	17.00 to	17.50
Low phos. sheet bar crops.	16.50 to	17.00
Low phos. plate scrap.	15.50 to	16.00
Blast Furnace Grades		
Cast iron borings.	9.00 to	9.25
Mixed bor'gs and short		
turn'gs	9.00 to	9.25
No. 2 busheling.	9.00 to	9.25
Cupola Grades		
No. 1 cast.	16.00 to	16.50
Railroad grate bars.	11.00 to	12.00
Stove plate	12.00 to	12.50
Rails under 3 ft.	16.75 to	17.25
Miscellaneous		
Railroad malleable	15.00 to	15.50
Rails for rolling.	16.25 to	16.50

lines of steel commodities was four-months' notes without interest and 3 per cent for cash in 30 days. During the panic of 1893 a discussion came up regarding these terms because the steel companies were acting practically as bankers and could not afford to carry this large line of credit. The terms were then changed for many steel products to 30 days net or 2 per cent off for cash in 10 days.

"This present method of cash discount is a carryover from those earlier periods when trade and economic conditions were quite different from what they are today. For instance, goods were a long time in transit, money fluctuated, credit information was very incomplete and funds were scarce. An attractive cash discount was therefore offered by the seller to hasten payment, but today that condition is reversed; money is stable and rapidly available, deliveries are quick and there is abundant credit information.

"Manufacturers of sheets and strips are no longer justified in offering a 2 per cent cash discount for payment in 10 days and the new terms of ½ of 1 per cent simply apply the practice which has already been established among manufacturers of hot-rolled strips, shapes, plates, bars and other iron and steel products. Thirty-day terms of sale are now practically standard in the steel industry. A 2 per cent cash discount in 10 days is equivalent to a rate of 36 per cent a year. With existing money rates this is out of reason.

"The manufacturer of sheets and strips is justified in paying a cash discount rate that is somewhere near the market value for funds at this time. Under the announced policy of ½ of 1 per cent we will be paying the equivalent of 9 per cent per annum."

Cash Discount Reduced on Sheets

American Rolling Mill Co. Announces New Rate of ½ of 1 Per Cent for Cash in 10 Days

THE American Rolling Mill Co. has announced that, effective from Oct. 1, next, the cash discount on sheets will be reduced from 2 per cent in 10 days to ½ of 1 per cent. This action probably will be followed by other sheet makers and a similar reduction in the allowance for prompt payment of invoices on cold-rolled strips is expected to become effective on the same date. Thus there will be only three steel products on which the inducement to pay by the tenth of each month will be more than ½ of 1 per cent. These are tubular goods, tin plate and wire products.

On nails and some other wire products, the discount is 2 per cent in 10 days and net in 60 days, while on woven wire fence, which has spring and fall datings, the discount amounts to as much as 4 per cent for early payment. Since consumers of tin

plate are largely under cover for the remainder of this year and the contracts call for 2 per cent off for payment in 10 days following receipt of invoice, no reduction in the discount is probable this year, but it is likely that on first quarter and first half of 1928 business, tin plate and sheets will again have a common discount. The cash discount on pipe also is 2 per cent.

Easier Money Makes Lower Cash Discount Necessary

Commenting on the change announced by the American Rolling Mill Co., an officer of a large sheet manufacturing company said:

"During the period following the Civil War a large cash discount was offered by the seller; in the early eighties and nineties the standard terms of payment for many general

Bulgarian Metal Working Plants Hold Convention

BERLIN, GERMANY, July 14.—A convention of the Bulgarian metal industries, held recently at Sofia, agreed upon the creation of an Association of Bulgarian Metallurgical Companies. It was further decided to urge official measures for encouragement of the domestic machinery manufacturers. It was pointed out at the meeting that the domestic machinery builders have so far developed as to be able to meet most of the Bulgarian requirements. Output of agricultural machinery in the past year is reported at 110,000,000 lewas. Acting through the Bulgarian National Bank, the Government arranged the sale of these machines in Bulgaria at greatly reduced prices and deferred payments. At the conference it was brought out that tractors are the only agricultural machines not produced within the country. A petition is to be presented to the Government requesting the delay of proposed large agricultural machinery orders until the home industry has had an opportunity to modernize plants.

Canada

Demand for Structural Steel and Reinforcing Bars Features Business Across the Border

TORONTO, ONT., July 31.—Canadian manufacturing plants are turning out in physical volume approximately 140 per cent of the output reached at the peak of war-time activity 10 years ago, and in spite of lower prices their products have a gross value over 20 per cent higher. The value for 1927 was recently stated to be in the neighborhood of \$3,500,000,000, or about \$250,000,000 above the figures for 1926. This constitutes a record in the history of the country and indicates the extent to which Canada has shared in the general industrialization of non-European countries since the war.

While considerable improvement in industrial activity has featured business in this country, still greater strength along this line is expected. At the moment it is felt that not only are the Canadian railroads reaching a point where it will be necessary for them to embark upon a large scale program of rolling stock improvement, but that also the quite extensive branch line undertakings now in hand by the railroads and others still in project will result in a necessity for large additions to rolling stock. In the meantime, several of the Canadian companies producing rolling stock and other railroad equipment have had under active organization and development new manufacturing departments which are having the result of not only diversifying their production, but making them less dependent upon a single source of business.

As an example, the Canadian Car & Foundry Co., among other things, is developing a substantial business in the pressing of frames for automobiles. The National Steel Car Co. is working on several new lines. The Canadian Bronze Co. has been adapting its production to meet the needs of certain industries, such as newsprint. The Canadian Locomotive Co. has been showing activity in the direction of mining machinery. These new departments promise to register growth over the next few years and should the expected improvement in rolling stock demands materialize, they will benefit accordingly.

Pig Iron.—A majority of melters who place quarterly contracts are covered up to the end of September, so advance buying of foundry and malleable pig iron has practically ceased. Spot sales, however, are holding up well, buying at the moment being at the high average for the year, and decidedly better than that of July a year ago. Consumers who are situated to take delivery of iron by water are favoring this method of transportation and are placing spot orders for as high as 500 tons. Prices remain unchanged in the Toronto market.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.	\$23.10 to \$23.60
No. 2 fdy., sil. 1.75 to 2.25.	23.10 to 23.60
Malleable	23.10 to 23.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.	24.50 to 25.00
No. 2 fdy., sil. 1.75 to 2.25.	24.50 to 25.00
Malleable	24.50 to 25.00
Basic	23.50 to 24.00
Imported Iron, Montreal Warehouse	
Summerlee	33.50
Carron	33.00

Structural Steel.—The demand for structural steel and reinforcing bars continues one of the features of the iron and steel industry of this country. Numerous orders have been closed for structural in lots ranging from 100 to 1000 tons and sizable tonnages are pending. For the new knitting mills at Hamilton, Ont., for J. R. Moddie & Sons, Ltd., 500 tons of reinforcing bars and 1500 tons of structural steel will be required. The Canada Permanent Mortgage Corporation, Toronto, will erect an office building at Bay and Adelaide Streets, for which approximately 7000 tons of structural steel will be required. Inquiries are out

for other proposed buildings, involving from 500 to 3000 tons, which are expected to be closed within the next two or three weeks.

Old Material.—Business in the scrap market remains quiet. Consumers are buying in small tonnages and only for immediate needs. Shipments of steel scrap into the Hamilton, Ont., district is a feature of the market, but little new buying is being done. Consumers throughout Ontario are ordering machinery cast and stove plate in limited tonnages. Prices are again showing a softening tendency, especially in the local market.

Dealers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel....	\$9.00	\$7.00
Rails, scrap	10.00	9.00
No. 1 wrought.....	9.00	11.00
Machine shop turnings..	7.00	5.00
Boiler plate	7.00	6.00
Heavy axle turnings....	7.50	6.50
Cast borings	7.50	5.00
Steel turnings	7.00	5.50
Wrought pipe	5.00	5.00
Steel axles	14.00	20.00
Axles, wrought iron....	16.00	22.00
No. 1 machinery cast....	....	16.00
Stove plate .....	....	13.00
Standard carwheels .....	....	16.00
Malleable .....	....	13.00
	Per Net Ton	
	Toronto	Montreal
No. 1 machinery cast....	15.00	....
Stove plate .....	....	9.00
Standard carwheels	13.00	....
Malleable scrap	13.00	....

St. Louis

Demand for Galvanized Sheets Improves—Tin Plate Active—Pig Iron Business Quiet

ST. LOUIS, July 31.—Sales of pig iron were rather light during the week, the St. Louis Gas & Coke Corporation getting 2000 tons, including 800 tons sold to an Illinois stove manufacturer and 200 tons to a northern Illinois melter and the remainder in lots of a carload or more. The insistence on immediate shipment of all orders is regarded as pointing to low stocks and consequent early buying. Business with stove foundries is reported to be better than usual at this time of year, and the melt of agricultural implement makers is being well sustained. The Granite City

maker has reduced its price to \$18.50 to \$19, f.o.b. furnace, and continues to meet competition from other makers of Northern iron. No inquiries for sizable tonnages are pending.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b....	....
Granite City, Ill.	\$18.50 to \$19.00
N'th'n No. 2 fdy., deliv'd St. Louis.	19.66
Southern No. 2 fdy., deliv'd.....	19.92
Northern malleable, deliv'd.....	19.66
Northern basic, deliv'd.....	19.66

Freight rates: 81c. Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Coke.—The usual summer dullness pervades the market for both domestic and foundry grades of coke, with no changes in prices. Not much activity is expected from dealers for the next few weeks, at least.

Finished Iron and Steel.—A marked improvement with respect to galvanized sheets was shown during the last week, according to the Granite City Steel Co. Incoming business was extremely satisfactory, the volume being sufficient to warrant operations virtually at capacity. Reports from various district offices in the South and Southwest indicate that a major buying movement is at hand. Sheet mill and tin mill business continues good, all units operating 100 per cent, or as close thereto as the summer heat will permit. Tin plate is in good demand, with prospects of continuing so for several months. Blue annealed sheets are not quite so

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock	3.75c.
Black sheets (No. 24).....	4.45c.
Galv. sheets (No. 24).....	5.25c.
Blue ann'd sheets (No. 10).....	3.60c.
Black corrug. sheets (No. 24).....	4.50c.
Galv. corrug. sheets.....	5.30c.
Structural rivets	3.75c.
Boiler rivets	3.75c.
	Per Cent Off List
Tank rivets, $\frac{1}{8}$ -in. and smaller, 100 lb. or more	70
Less than 100 lb.....	65
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-press. nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-press. nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

active as other items, although improved. Prices are steady, with a tendency toward stabilization. July warehouse business probably will show a falling off of about 15 per cent as compared with last month and July, 1927, which is largely due to the decrease in buying in the oil fields. The St. Louis industrial district demand holds up fairly well. The only structural job of consequence—825 tons for a terminal depot for the American Railway Express Co.—went to the Mississippi Valley Structural Steel Co.

Old Material.—The market for old material is extremely quiet. Consumers are showing little interest in the market, and it is not expected there will be any buying until the latter part of August. Dealers are buying from railroad lists to cover the few unfilled contracts. Railroad lists include: Pennsylvania, 43,565 tons; Union Pacific, 1990 tons; Big Four, 1400 tons; Standard Oil of Indiana,

110 tons; Missouri Pacific, 105 carloads; Chicago, Milwaukee & St. Paul, 167 carloads; Nickel Plate, 31 carloads and Frisco Lines, 17 carloads.

Dealers' buying prices, per gross ton, f.o.b. St. Louis district:

Heavy melting steel.....	\$10.50 to \$11.00
No. 1 locomotive tires....	12.00 to 12.50
Heavy shoveling steel....	10.50 to 11.00
Miscell. stand.-sec. rails, includ'g frogs, sw'ches and guards, cut apart...	12.00 to 12.50
Railroad springs.....	13.00 to 13.50
Bundled sheets.....	8.50 to 9.00
No. 2 railroad wrought....	11.00 to 11.50
No. 1 busheling.....	9.25 to 9.75
Cast iron borings.....	8.25 to 8.75
Iron rails.....	13.00 to 13.50
Rails for rolling.....	12.75 to 13.25
Machine shop turnings....	6.25 to 6.75
Steel car axles.....	16.75 to 17.25
Iron car axles.....	25.75 to 26.25
Wrot. iron bars and trans.	18.00 to 18.50
No. 1 railroad wrought....	9.00 to 9.50
Steel rails, less than 3 ft.	15.00 to 15.50
Steel angle bars.....	11.50 to 12.00
Cast iron carwheels.....	12.75 to 13.25
No. 1 machinery cast....	13.00 to 13.50
Railroad malleable.....	11.25 to 11.75
No. 1 railroad cast.....	13.00 to 13.50
Stove plate.....	10.50 to 11.00
Agricult. malleable.....	12.00 to 12.50
Relay. rails, 60 lb. and under.....	20.50 to 23.50
Relay. rails, 70 lb. and over.....	26.50 to 29.00

Birmingham

Galvanized and Black Sheets Reduced \$1 a Ton—Pig Iron Demand Steady

BIRMINGHAM, July 31.—Pig iron melters prefer to carry light stocks and are demanding quick deliveries. Pending business is largely confined to small lots, but sales have improved noticeably during July. The market is firm at \$15.50. Some iron is being sold for September delivery, but a portion of the third quarter requirements is yet to be placed. Shipments by merchant producers have been ahead of the make for the past several days. This has been aided by reduced production due to pending furnace repairs by one company. Makers of cast iron pressure pipe, radiators and heavy machinery are among the heavy users. No changes in furnace operations have been made during the past week. Seventeen furnaces are in blast, eight being on foundry, seven on basic, one on recarburizing iron and one on ferromanganese.

Prices per gross ton f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$15.50
No. 1 fdy., 2.25 to 2.75 sil.	16.00
Basic.....	\$15.00 to 16.00

Finished Steel.—Demand for steel bars, shapes and plates continues steady and above the average for this season of the year. New business booked during July was heavier than that of the same month last year and showed a slight gain over that of June. Prices on bars, plates and shapes show a tendency toward greater stability. Quotations on galvanized and black sheets have been reduced \$1 a ton. Mill operations in the district were increased slightly during the past week. Railroad accessory buying is slack. Business is quieter with structural steel fabricators and bar manufacturers. The

Virginia Bridge & Iron Co. has received an order from the Alabama Power Co. for 600 tons of structural steel for a power house. Open-hearth operations have been the same during the past two weeks; the Tennes-

see company is operating six at Ensley and six at Fairfield and the Gulf States Steel Co., three at Alabama City.

Cast Iron Pipe.—The market has been quiet and below normal for the past three weeks. New business is confined to small orders and the tonnage booked outside of the district is very light. Plant operations are at a fair level due to accumulation of small orders. Shipments have been fairly steady through July. Makers are holding closely to quotations of \$34 to \$35 for third quarter delivery.

Coke.—Demand for foundry coke continues light, reflecting midsummer conditions. Coke under contract is moving out at a fairly steady rate, though the total volume for July is somewhat less than that of June. The \$5 quotations for both spot and contract are unchanged.

Old Material.—The market has developed a better feeling than has been found for several weeks. Demand is somewhat stronger in nearly all lines, but sales are unusually light. Scrap steel rail and No. 1 cast are holding first place in the amount of activity. Prices are low and unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$8.50 to \$9.00
Scrap steel rails.....	11.00 to 11.50
Short shoveling turnings..	7.50 to 8.00
Cast iron borings.....	8.00
Stove plate.....	13.50
Steel axles.....	19.00 to 20.00
Iron axles.....	20.00 to 21.00
No. 1 railroad wrought....	10.00 to 10.50
Rails for rolling.....	13.00
No. 1 cast.....	14.25
Tramcar wheels.....	12.50 to 13.50
Cast iron carwheels.....	12.00 to 13.00
Cast iron borings, chem..	13.50 to 14.00

Youngstown

Ingot Production Close to 80 Per Cent—Most Finished Products Doing Well

YOUNGSTOWN, July 31.—If July ingot production of this district is less than that of the month before, it will be only a trifling decrease and will be chargeable largely to the limited rate of finishing mill operations and the consequent slowing up of steel production in Fourth of July week. Plant engagement since has been on a rising scale and today finds ingot output at close to 80 per cent of capacity.

The Republic Iron & Steel Co. has 12 of its 13 open-hearth furnaces in Youngstown in production, while all eight of the furnaces at its Warren works are melting. The Youngstown Sheet & Tube Co. has in operation all of its open-hearth furnaces at Campbell and five at its Brier Hill works, or 17 out of a total of 24 at both plants. The Sharon Steel Hoop Co. is operating four of its six furnaces at Lowellville. The total of active independent open-hearth units is 41 out of a total of 53. Bessemer production is rather low, with Republic Iron & Steel Co. operating only one converter on a single turn daily. The rate of output of the Carnegie Steel Co. in this district is well up to the average of the independent companies. This company recently took off furnaces

for repairs at its Ohio works and at its Farrell, Pa., works, but the Ohio works furnace again is in blast. Of the 26 steel works blast furnaces in the Mahoning and Shenango Valleys, 17 are producing iron.

Of the finished steel products of the district, only nails and wire are having an unsatisfactory sale. Steel bars are doing well and business in sheets is active enough to encourage producers to take a stronger price stand. In addition to the liberal amount of pipe line tonnage that came to this district in the latter part of June and the fore part of July, producers have been getting a little more oil country pipe business, and the demand for building and construction pipe is steady, though individual orders are small. There is little complaint as to

the demand for strips, but there is as to the prices at which they are selling.

There have been few periods in the history of tin plate when demand was better than it is now. The American Sheet & Tin Plate Co. has all of its tin mills in the Shenango Valley in operation and has found it necessary to work an extra turn to bring up the production, somewhat impaired by the fact that the mills' crews have been unable to stand up under the heat inside and outside the plants.

It is small wonder that, enjoying such a good business and plant operation at this time of the year, steel makers view the situation optimistically.

The Republic Iron & Steel Co. has advised its district offices that shortly it will complete changes in its old 20-in. skelp mill and use it as a mill

warehouse, in which will be carried a stock of merchant steel bars, bar mill angles and light channels and concrete reinforcing bars. It is stated that the establishment of this mill warehouse does not mean the company intends to enter the warehouse steel business, but having been handicapped in making promises of deliveries by reason of having no rollings scheduled, the warehouse stocks will be available and shipments can be made without the former dependence upon mill rolling schedules. Carload shipments from the warehouse will take the mill shipment prices, but on less than carload lots there is a minimum extra charge of \$5 a ton. The company plans to stock the 10 sizes of concrete reinforcing bars in 60-ft. lengths, but no fabricating or bending of them is to be attempted.

independent companies have quoted as low as 2.20c.

Shapes.—Although shape awards totaled less than 700 tons this week, pending business amounts to more than 12,000 tons, several large projects having come out for figures during the past few days. The Western Iron Works took 165 tons for an apartment in San Francisco. Bids will be opened Aug. 15 for 1400 tons for four sheds on pier 45, San Francisco, and bids are now being taken on 450 tons for a hotel in San Francisco. Claude Fisher, Los Angeles, was low bidder on the Bardsdale bridge at Ventura, Cal., calling for 570 tons. No change in the price of plain material has occurred, 2.35c., c.i.f. coast ports, being firm.

Cast Iron Pipe.—Awards so far this year are considerably below the total for the corresponding period last year. The Southwest Paving Co., Los Angeles, received the only large award of the week. This was 133 tons of 6 to 10-in. class B pipe for the improvement of El Centro Street in South Pasadena, Cal. Sierra Madre, Cal., voted bonds for a water system and bids will be called for shortly for 1053 tons of 4 to 16-in. class B pipe. The Monterey Water Co., Monterey, Cal., is taking bids on 530 tons. Compton, Cal., will open bids on Aug. 7 for 148 tons of 2 and 4-in. class B pipe, and Dallas, Tex., will open bids on Aug. 10 for 23,247 tons of 16 to 36-in. classes B and C pipe, with alternate bids on steel and concrete pipe. The Weyerhaeuser Timber Co., Longview, Wash., will shortly come into the market for 1503 tons of 4 to 12-in. class C pipe.

Standard Pipe.—Demand for both oil country goods and standard steel pipe has been limited to exceptionally small lots. Los Angeles has opened bids on 100,000 ft. of 1-in. extra heavy galvanized pipe and will make an award next week.

Coke.—Both inquiries and sales of foundry coke have been confined to small lots for prompt shipment, stock in foundry yards being sufficient to take care of present requirements.

San Francisco

Structural and Reinforcing Steel Demand Continues Active —7200 Tons of Plates Needed for Pipe Lines

SAN FRANCISCO, July 28 (By Air Mail).—During the past week a lull has occurred in demand for most forms of finished steel, although reinforcing steel bars and structural shapes continue active. Important new projects include 1400 tons of structural shapes for four sheds at pier 45, San Francisco; 7200 tons of plates for small-sized pipe lines for Oakland's municipal utility district and more than 23,000 tons of cast iron pipe for Dallas, Tex. The largest award of the week was 260 tons of shapes for a bridge at Benson, Ariz., booked by the Virginia Bridge & Iron Co.

Pig Iron.—The only inquiry of importance is for 400 tons for the Puget Sound Navy Yard. Little or no improvement is noticed in the rate of operations among jobbing foundries, which comprise the bulk of the plants on the coast, and as a result both sales and inquiries have been limited to small lots. Prices are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	.....	\$25.00 to \$26.00
*Utah fdy., sil.	2.75 to	
3.25	.....	25.00 to 26.00
**Indian fdy., sil.	2.75 to	
3.25	.....	24.00 to 25.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Bars.—Out-of-stock prices in the bay district are firmer than in months, and while 2c. is shaded occasionally the tendency is to hold to this level, which is only a few dollars a ton higher than mill prices for reinforcing material. The largest award went to the Pacific Coast Steel Co. and involved 300 tons for two Seattle projects. Several large jobs have come out for figures, including 460 tons for

a storm drain at Culver City, Cal., 1500 tons for an apartment in Los Angeles and 300 tons for a power house in San Francisco.

Plates.—Demand for plates is quiet and only two projects of more than 100 tons are up for figures. The largest of these involves 7200 tons of 5/16 to 3/8-in. material for water mains in Oakland, bids on which will be opened Aug. 17. The Navy Department will open bids Aug. 7 for 131 tons for the Puget Sound Navy Yard. Practically all large producers are now quoting 2.25c., c.i.f., and some of the smaller

Boston

Pig Iron Market Dull as Most Consumers Are Covered for This Quarter—Scrap Quiet

BOSTON, July 31.—Not much pig iron business was done in the past week. Sales included Mystic, Buffalo, eastern New York State, western Pennsylvania and Alabama irons in small tonnages, with an aggregate of not more than 3000 tons. Buying for third quarter is practically over and most foundries have enough iron on hand or on order to last well into the fourth quarter. A large consumer has intimated to sellers that it will be in the market for a substantial tonnage late in August. The Universal Winding Co., Providence, R. I., is calling for bids on 500 tons of No. 2X

and 500 tons of No. 1X, deliveries to run from September through December. So far as prices go, it is still a buyer's market.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil.	1.75 to 2.25	..\$20.91 to \$21.41
*Buffalo, sil.	2.25 to 2.75	.. 21.41 to 21.91
†Buffalo, sil.	1.75 to 2.25	.. 19.78 to 20.28
†Buffalo, sil.	2.25 to 2.75	.. 20.28 to 20.78
East. Penn., sil.	1.75 to 2.25	.. 23.15 to 23.65
East. Penn., sil.	2.25 to 2.75	.. 23.65 to 24.15
Va., sil.	1.75 to 2.25	..... 25.71
Va., sil.	2.25 to 2.75	..... 26.21
Ala., sil.	1.75 to 2.25	..... 22.41 to 24.27
Ala., sil.	2.25 to 2.75	..... 22.91 to 24.77

Freight rates: \$4.91 all rail and \$3.78 rail and water from Buffalo; \$3.65 from eastern Pennsylvania; \$5.21 all rail from Virginia; \$6.91 to \$8.77 from Alabama.

*All rail rate. †Rail and water rate.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	..... 3.15c.
Soft steel bars	..... 3.15c.
Small angles, 3/8-in. and over	..... 3.15c.
Small angles, under 3/8-in.	..... 3.55c.
Small channels and tees, 3/4-in. to 2 3/4-in.	..... 3.75c.
Spring steel, 3/4-in. and thicker	..... 5.00c.
Black sheets (No. 24)	..... 4.95c.
Blue ann'l'd sheets (No. 10)	..... 3.90c.
Galv. sheets (No. 24)	..... 5.50c.
Struc. rivets, 3/4-in. and larger	..... 5.65c.
Com. wire nails, base per keg	..... \$3.40
Cement c'd nails, 100-lb. keg	..... 3.40

Coke.—The New England Coal & Coke Co. and the Providence Gas Co. announce that the price of by-product foundry coke on contract shipments during August will remain at \$11 a ton, delivered within a \$3.10 freight rate zone. These ovens shipped more foundry coke in July than in any previous month this year. Despite the increase, the New England melt of iron is not more than 65 per cent of capacity and in all probability nearer 60 per cent, owing to the small melt by textile machinery makers. A little Connellsville foundry coke is moving into New England at \$5 a ton, ovens, or \$10.54, delivered in box cars, and at \$10.29 a ton, delivered in open cars.

Bars.—Consumption of steel bars is holding up well and running ahead of last year. The market is firm at 1.90c., base Pittsburgh. There is more stability in prices of reinforcing bars than in months, notwithstanding the keen competition for the small amount of business. The mill price now appears firm at 1.90c., base Pittsburgh, and the delivered price at \$2.26½, common Boston freight rate points, while the warehouse price is 2.90c., base.

Old Material.—Most of the activity in old material centers in the export market. A steamer is loading 3500 tons of scrap for shipment to Italy, and another boat will shortly begin loading 4000 to 5000 tons for shipment to Danzig. Exporters are still paying \$9.25 a ton, on dock, for No. 1 steel and \$8.75 for No. 2. Prices on material for domestic consumption are unchanged. They are unattractive to owners of material, consequently little scrap is moving. One or two dealers heretofore offering \$5 to \$5.50 a ton, on cars shipping point, for mixed borings and turnings, have dropped to \$4.50 to \$5, but others are holding to \$5 to \$5.50. New England foundries

Warehouse Prices, f.o.b. Boston	
	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams.....	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes.....	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway, squares and flats.....	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hex.....*	3.45c. to 5.45c.
Squares and flats.....*	3.95c. to 6.95c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.50c.
Per Cent Off List	
Machine bolts .....	.50 and 5
Carriage bolts .....	.50 and 5
Lag screws .....	.50 and 5
Hot pressed nuts .....	.50 and 5
Cold-punched nuts .....	.50 and 5
Stove bolts .....	.70 and 10

*Including quantity differentials.

are taking only limited machinery cast tonnages.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.	\$8.00 to \$8.50
Scrap T rails.....	7.50 to 8.00
Scrap girder rails.....	7.25 to 7.50
No. 1 railroad wrought....	8.50 to 9.00
No. 1 yard wrought.....	7.00 to 7.50
Machine shop turnings.....	5.00 to 5.50
Cast iron borings (steel works and rolling mill).....	5.00 to 5.50
Bundled skeleton, long.....	6.50 to 7.00
Forge flashings.....	6.50 to 7.00
Blast furnace borings and turnings	5.00 to 5.50
Forge scrap	5.50 to 6.00
Shafting	11.50 to 12.00
Steel car axles.....	14.50 to 15.00
Wrought pipe 1 in. in diameter (over 2 ft. long).....	7.00 to 7.50
Rails for rolling.....	9.50 to 10.00
Cast iron borings, chemical	9.50 to 10.00
Prices per gross ton deliv'd consumers' yards:	
Textile cast	\$13.50 to \$14.00
No. 1 machinery cast.....	14.00 to 14.50
No. 2 machinery cast.....	12.50 to 13.50
Stove plate	10.00 to 10.50
Railroad malleable.....	13.50 to 14.50

Detroit

Automobile Production at High Rate—Employment Shows a Gain of 5000 in Past Week

DETROIT, July 31.—The so-called midsummer slump has not greatly affected the metalworking industry in this area, owing chiefly to the manner in which automobile production schedules have been holding up. As a matter of fact, the past week showed an increase of 5001 men on the report of the Employers' Association. The companies included in this report employ about two-thirds of the city's working population. The total this week is 270,557, or 68,563 more than the corresponding figure for 1927.

The final figures on Chevrolet output for the first six months of this year total 751,536 units, compared with 607,749 units for the same period of 1927. The final figures for June are 132,794 for the current year and 112,794 for June, 1927. It is estimated that both Chevrolet and Buick will have record outputs for the third quarter.

Chrysler is shipping about 1200 units a day. The original Chrysler schedule for the third quarter was set at 86,000 units, but has been revised to include an additional 500 units a day for the new Plymouth line. Including the third quarter production, the total output for Chrysler will exceed the 1927 figure of 192,000 cars, which up to that time was a record.

Dodge Brothers, Inc., showed shipments of 121,327 units up to June 30. This compares with 107,115 units for the same period of 1927. The gain is 13.3 per cent.

The Graham Paige Motors Corporation, with approximately 44,000 units, has more than doubled its entire output of 1927. Additional factory facilities now under way will increase capacity from 400 cars to 600 cars per day. These changes will include the erection of new buildings

and the installation of new equipment at both the main plant and the body plant at Wayne. These additions represent about \$700,000 for construction and equipment. This company has also purchased a group of buildings at Fort and McKinstry Streets, with 262,000 sq. ft. of floor space, to house the service and export shipping departments previously quartered at the main plant.

Output for the Willys Overland Co. is running about 1500 cars per day, 1100 of which are the Whippets. Production lines are going five and a half days a week on a two-shift basis. Parts manufacturing is partly on a three-shift basis. This company has let a \$250,000 contract for an addition to the new export building, which was completed only two months ago.

General Motors Corporation shows total production for the first six months of 1,083,316 units, compared with 883,477 for the same period of 1927.

The Hudson Motor Car Co. has just put into operation a new \$1,000,000 plant for lacquering and metalworking.

Paul G. Hoffman, vice-president Studebaker Corporation, states that retail deliveries have increased from 40 to 50 per cent since the introduction of the new model two weeks ago.

Shipments of pig iron in the district are considerably above those of June. August promises to continue at the present rate.

There is very little activity in the scrap market. Prices are unchanged.

Buffalo

Good Volume of Small-Lot Pig Iron Buying

BUFFALO, July 31.—Small-lot pig iron business has been brisk. There has been no large tonnage buying during the past 10 days, but there have been enough sales of lots up to 500 tons to make up a good volume. Inquiry is small, but includes one lot of 1000 tons. July shipments were greater than production, but the movement shows a tendency to slow up a little now. Buffalo sellers quote iron for local delivery on a \$17 base for foundry and \$17.50 for malleable.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....	\$17.00
No. 2X fdy., sil. 2.25 to 2.75.....	17.50
No. 1X fdy., sil. 2.75 to 3.25.....	18.50
Malleable, sil. up to 2.25.....	17.50
Basic	\$16.50 to 17.00
Lake Superior charcoal.....	27.28

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struct. shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars	2.75c.
Cold-fin. flats, sq. and hex.....	4.45c.
Rounds	3.95c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.70c. to 5.05c.
Blue ann'd sheets (No. 10).....	3.70c.
Com. wire nails, base per keg.....	\$3.65
Black wire, base per 100 lb.....	3.90

Old Material.—Both the Bethlehem and Donner companies are taking fairly large shipments of heavy melting steel. No new buying has been done as there is a very large tonnage under contract for delivery during the next 60 days. Prices remain largely nominal in the absence of tonnage buying.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.	\$13.50 to \$14.00
No. 2 heavy melting steel.	12.00 to 12.50
Scrap rails	13.00 to 13.50
Hydraulic comp. sheets	12.00 to 12.50
Hand bundled sheets	8.00 to 8.50
Drop forge flashings	12.00 to 12.50
No. 1 busheling	12.00 to 12.50
Hvy. steel axle turnings	12.00 to 12.50
Machine shop turnings	7.00 to 7.50
Acid Open-Hearth Grades	
R'l'r'd knuckles and couplers	15.00
R'l'r'd coil and leaf springs	15.00 to 16.00
Rolled steel wheels	15.00
Low phos. billet and bloom ends	16.00 to 16.50
Electric Furnace Grades	
Hvy. steel axle turnings	12.00 to 12.50
Short shov. steel turnings	9.00 to 9.50
Blast Furnace Grades	
Short shov. steel turnings	9.00 to 9.50
Short mixed borings and turnings	9.00 to 9.50
Cast iron borings	9.00 to 9.50
No. 2 busheling	9.00 to 9.25
Rolling Mill Grades	
Steel car axles	15.50 to 16.00
Iron axles	19.50 to 20.00
No. 1 railroad wrought	12.00 to 12.50
Cupola Grades	
No. 1 machinery cast	14.25 to 14.75
Stove plate	13.00 to 13.25
Locomotive grate bars	11.25 to 11.75
Steel rails, 3 ft. and under	16.50
Cast iron carwheels	12.00 to 12.50
Malleable Grades	
Industrial	15.00
Railroad	15.00
Agricultural	15.00

Cincinnati

Pig Iron Demand Better—Steel Sales in Good Volume

CINCINNATI, July 31.—Pig iron prices are unchanged in this market, with demand slightly better and prospects brighter. In the past few days one company has sold a 500-ton lot and another lot of 250 tons of Northern iron, both going to southern Ohio consumers. A few smaller orders have been taken by local firms, the week's sales totaling about 2000 tons. Some inquiries have been received, the largest for 3000 tons covering the requirements for the rest of the year of the Marmon Motor Car Co.; Northern iron is specified. A few small inquiries are under consideration, mostly for prompt delivery.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	\$19.89
So. Ohio malleable	\$20.14 to 20.89
Ala. fdy., sil. 1.75 to 2.25	19.19
Ala. fdy., sil. 2.25 to 2.75	19.69
Tenn. fdy., sil. 1.75 to 2.25	19.19
So'th'n Ohio silvery 8 per cent	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Material.—Small-lot buying of bars, structural shapes and plates continues in fair volume and specifications against third quarter contracts have been about normal. Operations among consuming industries are being sustained on a higher

plane than usual for this time of the year, so that producers are predicting that the mid-summer recession in orders will scarcely be discernible. Prices of heavy steel products are being maintained at 1.90c., base Pittsburgh. Structural steel in this district is still devoid of features, although fabricating shops are moderately well engaged on numerous small jobs. The nail and wire market has recovered somewhat from the depression created by the lack of interest on the part of consumers, sales having been the best in four weeks. Common wire nails are quoted at \$2.55 per keg, Ironton, plus a barge rate for delivery to Ohio River points. Sheet mills have booked impressive tonnages during the past two weeks, so that incoming business has been considerably ahead of that in July, 1927. Meanwhile, production has been kept at about 90 per cent of capacity. Prices are still a cause of concern to manufacturers. Galvanized sheets for roofing purposes have been selling at 3.30c. to 3.40c., base Pittsburgh, in the South, with 3.50c. prevailing in a few cases. Blue annealed ranges from 1.90c. to 2c., and black sheets are bringing from 2.60c. to 2.70c.

Warehouse Business.—Jobbers booked about 5 per cent less business in July than in June, the decline having been caused by seasonal conditions. Structural steel is in better demand and bars continue active. Prices are unchanged.

Coke.—Coke movement is very little better. Indications are that July movement will be slightly below that of June, the percentage, however, being very slight.

Foundry coke prices per net ton deliv'd Cincinnati: By-prod. coke, \$9.02; Wise County coke, \$7.09 to \$7.59; New River coke, \$9.09 to \$9.59. Freight rates, \$2.14 from Ashland, Ky.; \$2.59 from Wise County and New River ovens.

Old Material.—The scrap market is looking slightly better; some sales are noted and some inquiries are under consideration. A sale of 2000 tons borings and turnings to a nearby blast furnace was at unchanged prices. Business is slowing down, as it usually does when rail offerings are reported. The Big Four offers only 1200 tons, closing July 31, but the Pennsylvania has approximately 50,000 tons to close Aug. 1, the New York

Warehouse Prices, f.o.b. Cincinnati

Base per Lb.	
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinf. bars	3.15c.
Rail steel reinf. bars	3.00c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-fin. rounds and hex.	3.85c.
Squares	4.35c.
Black sheets (No. 24)	3.90c.
Galvanized sheets (No. 24)	4.75c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	.65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	\$3.00
Com. wire nails, base per keg	2.95
Cement c'd'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.	7.55
Net per 100 Ft.	
Lap-weld. steel boiler tubes, 2-in.	\$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in.	19.00
4-in.	39.00

Central a blind offer to terminate Aug. 2, and the B. & O. 10,000 tons to close Aug. 1. The Erie offers a blind lot to close Aug. 1.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	\$10.75 to \$11.25
Scrap rails for melting	10.75 to 11.25
Loose sheet clippings	8.00 to 8.50
Bundled sheets	9.00 to 9.50
Cast iron borings	7.25 to 7.75
Machine shop turnings	6.75 to 7.25
No. 1 busheling	10.00 to 10.50
No. 2 busheling	6.00 to 6.50
Rails for rolling	12.50 to 13.00
No. 1 locomotive tires	12.75 to 13.25
No. 1 railroad wrought	10.00 to 10.50
Short rails	15.75 to 16.25
Cast iron carwheels	11.00 to 11.50
No. 1 machinery cast	15.00 to 15.50
No. 1 railroad cast	12.75 to 13.25
Burnt cast	7.50 to 8.00
Stove plate	8.25 to 8.75
Brake shoes	9.50 to 10.25
Railroad malleable	11.50 to 12.00
Agricultural malleable	10.50 to 11.00

Obituary

WALDO G. LUNGER, formerly western manager for the Union Twist Drill Co., Athol, Mass., with headquarters at Chicago, died on July 27 at Rome, N. Y., where he had resided since ill health forced his retirement some time ago. He was a graduate in mechanical engineering from the Stevens Institute of Technology, Hoboken, N. J.

EDGAR EVERETT STARK, hydroelectric engineer, died July 26 while addressing a Rotary Club luncheon at Poultney, Vt. He was 64 years of age, and Painesville, Ohio, was his birthplace. After graduation from the Case School of Applied Science, Cleveland, in 1882, he worked for several years with the Brush Laboratories, Cleveland, owned by Charles F. Brush, inventor of the arc light. In 1903 he moved to New Zealand and in the succeeding 18 years he built hydroelectric systems in various parts of Australia.

JAMES MCNAUGHTON, vice-president Baldwin Locomotive Works, in charge of its New York office, died on July 27 at his home in Bronxville, N. Y., aged 68 years. He was born at Queensville, Ont., and early in life entered the employ of a railroad equipment manufacturer in Minnesota. Later he became associated with the American Locomotive Co., rising to a vice-presidency. During the World War he was instrumental in the organization of the Eddystone Munition Works, Eddystone, Pa., becoming president and general manager of the plant. At the close of the war he went with the Baldwin organization as a vice-president.

W. L. ARNOLD, until 1926 a vice-president of the Arnold Co., Chicago, engineer and constructor, died July 27.

HENRY J. BURT, structural engineer associated with Holabird & Roche, Chicago architects, died July 28, aged 55 years.

Non-Ferrous Metal Markets

Copper Steady and Firm, Tin Slightly Easier, Lead and Zinc Unchanged, Antimony Advances

Copper.—Consumers have come into the market to a moderate extent during the past week for September copper. It is estimated in some quarters that about 20 per cent of the metal that will be needed for that month has been bought, and producers have now opened their books for October. There is very little August copper available, but all of the important users are well covered, so there is little fear of a shortage.

Metals from New York Warehouse

Delivered Prices Per Lb.	
Tin, Straits pig.....	50.00c. to 51.00c.
Tin, bar	52.00c. to 53.00c.
Copper, Lake.....	15.75c.
Copper, electrolytic.....	15.50c.
Copper, casting	14.75c.
Zinc, slab	7.25c. to 7.75c.
Lead, American pig.....	7.25c. to 7.75c.
Lead, bar	9.25c. to 10.25c.
Antimony, Asiatic.....	12.00c. to 12.50c.
Aluminum No. 1 ingots for remelting (guar'nt'd over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy.....	24.00c. to 25.00c.
Babbitt metal, commerc'l grade, 30.00c. to 40.00c.	
Solder, ½ and ½.....	32.50c. to 33.50c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.	
Tin, Straits pig.....	53.00c.
Tin, bar	57.00c.
Copper, Lake.....	14.85c.
Copper, electrolytic.....	14.85c.
Copper, casting	14.00c.
Zinc, slab	8.00c.
Lead, American pig.....	7.00c.
Antimony, Asiatic	16.00c.
Lead, bar	9.50c.
Babbitt metal, medium grade.....	18.50c.
Babbitt metal, high grade.....	56.50c.
Solder, ½ and ½.....	31.25c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.	
Sheets—	
High brass	19.25c.
Copper, hot rolled.....	24.00c.
Copper, cold rolled, 14 oz. and heavier	25.75c.
Seamless Tubes—	
Brass	24.12½c.
Copper	25.00c.
Brazed Brass Tubes.....	27.25c.
Brass Rods.....	17.00c.

From New York Warehouse	
Delivered Prices, Base Per Lb.	
Zinc sheets (No. 9), casks	10.00c. to 10.50c.
Zinc sheets, open.....	11.00c. to 11.50c.

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	July 31	July 30	July 28	July 27	July 26	July 25
Lake copper, New York.....	14.75	14.75	14.75	14.75	14.75	14.75
Electrolytic copper, N. Y.*.....	14.50	14.50	14.50	14.50	14.50	14.50
Straits tin, spot, N. Y.	47.75	47.75	....	47.82½	48.20	48.75
Lead, New York.....	6.20	6.20	6.20	6.20	6.20	6.20
Lead, St. Louis.....	6.00	6.00	6.00	6.00	6.00	6.00
Zinc, New York.....	6.55	6.55	6.55	6.55	6.55	6.55
Zinc, St. Louis.....	6.20	6.20	6.20	6.20	6.20	6.20

*Refinery quotation; delivered price ¼c. higher.

Prices for electrolytic copper remain unchanged at 14.75c., delivered Connecticut Valley, as the domestic basis; while the export price is 15c., delivered European ports. Demand for Lake copper has been fairly active, mostly for August but some for September. Prices range from 14.75c. to 14.82½c., delivered.

Copper Averages.—The average price of Lake copper for the month of July, based on daily quotations in THE IRON AGE, was 14.76½c., delivered. The average price of electrolytic copper was 14.50c., refinery, or 14.75c., delivered in the Connecticut Valley.

Tin.—Except on Wednesday last, when consumers came into the market for nearby tin, the market has

been fairly quiet. About 400 tons was sold on Wednesday at an average of 48.75c., with some sales at 49c., but the price has since declined and today the market was quotable at 47.75c., which, however, represents a decline of only ¼c. per lb. in the week. Yesterday (Monday) there was again a good demand from consumers, but not much business resulted. London prices today were £214 for spot standard, £213 5s. for future standard, £216 15s. for spot Straits; the Singapore price was £215 10s.

Lead.—With business moderately good, the lead market has been steady throughout the week. Prices remain at 6c., St. Louis, and 6.20c., New York, the latter being the contract

Non-Ferrous Rolled Products

Zinc sheets were advanced ½c. per lb. on July 30 and are now quoted at 9.75c., base. There has been no change in mill prices on bronze, brass and copper products and zinc sheets are still quoted at 10c. to 10.25c.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	19.25c.
Copper, hot rolled.....	23.50c.
Zinc	9.75c.
Lead (full sheets).....	10.00c. to 10.25c.
Seamless Tubes—	
High brass.....	24.12½c.
Copper	25.00c.
Rods—	
High brass.....	17.00c.
Naval brass.....	19.75c.
Wire—	
Copper	16.75c.
High brass.....	19.75c.
Copper in Rolls.....	22.50c.
Brazed Brass Tubing.....	27.25c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods.....	34.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	12.625c.	14.00c.
Copper, hvy. and wire.....	12.50c.	13.50c.
Copper, light and bottoms	10.75c.	12.00c.
Brass, heavy.....	7.00c.	8.25c.
Brass, light	6.00c.	7.50c.
Hvy. Machine composition	9.75c.	11.00c.
No. 1 yel. brass turnings	8.75c.	9.50c.
No. 1 red brass or compos. t'ngs.....	9.00c.	10.00c.
Lead, heavy	5.00c.	5.375c.
Lead, tea	3.75c.	4.25c.
Zinc	3.00c.	3.50c.
Sheet aluminum	12.50c.	14.50c.
Cast aluminum	11.75c.	13.50c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices * Cover Trucking to Consumers' Doors in City Limits)

	Base per Lb.
Sheets—	
High brass.....	19.25c.
Copper, hot rolled.....	23.50c.
Copper, cold rolled, 14 oz. and heavier	25.75c.
Zinc	10.00c.
Lead, wide	9.75c.
Seamless Tubes—	
Brass	25.62½c.
Copper	26.50c.
Brazed Brass Tubes.....	27.25c.
Brass Rods.....	17.00c.

price of the American Smelting & Refining Co.

Zinc.—Prices are slightly stronger. While there were small sales during the week at 6.20c., East St. Louis, for prime Western, the bulk of the metal available at this price may have been taken and producers generally are asking 6.25c. for forward delivery. Indications are that 6.25c. may become the minimum of the market before the end of the week.

Antimony.—With more active business, antimony has strengthened within the week and today was quoted at 10c. for spot and 10.25c. for forward delivery, duty paid, New York.

Nickel.—Prices are unchanged at 35c. for ingot, 36c. for shot and 37c. for electrolytic nickel.

Aluminum.—Virgin metal, 98 to 99 per cent, continues at 23.90c. in

the outside market. The Aluminum Co. of America quotes 99 per cent plus at 24.30c.

Non-Ferrous Metals at Chicago

CHICAGO, July 31.—The local market is quiet, with sales in small volume and prices unchanged, except in tin, which has been advanced. Quotations for old metals are untested in a dull market.

Prices, per lb., in carload lots:
Lake copper, 14.87½c.; tin, 49.50c.; lead, 6.10c.; zinc, 6.30c.; in less-than-carload lots, antimony, 11.25c. On old metals we quote copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 9.75c.; red brass, 9.50c.; yellow brass, 7.25c.; lead pipe, 4.75c.; zinc, 3.50c.; pewter, No. 1, 30c.; tin foil, 36.25c.; block tin, 45.25c.; aluminum, 12c.; all being dealers' prices for less-than-carload lots.

Fabricated Structural Steel

New York Office Building Will Take 16,600 Tons and Chicago Board of Trade, 15,000 Tons—Awards Light

AN office building in New York, calling for 16,600 tons, and a structure for the Chicago Board of Trade, which will take 15,000 tons, brought the total of new projects reported during the week to 46,300 tons. Other large pending jobs which have come out recently are a municipal water development at Oakland, Cal., involving 7200 tons of plates, and a Cleveland hospital of 4000 tons. The following awards of 22,700 tons include no jobs of outstanding size:

WORCESTER, MASS., 700 tons, school, to Eastern Bridge & Structural Co.
STATE OF VERMONT, 400 tons, bridges, to American Bridge Co.
PROVIDENCE, 1500 tons, Memorial Bridge, to Phoenix Bridge Co.
HARTFORD, CONN., 600 tons, alteration to department store of Sage, Allen & Co., to an unnamed local fabricator.
NEW YORK, 14,275 tons reported to Structural Steel Board of Trade; 5400 tons in the following jobs not previously reported: Extension to East River power station at Fourteenth Street, to Post & McCord, Inc.; building for National City Bank, 3 West Twenty-eighth Street, to Taylor-Fichter Steel Construction Co., and Mount Washington Presbyterian Church, 84 Vermilyea Avenue, to Eidlitz & Ross.
NEW YORK, 1300 tons, addition to store of Bedell Co., 19 West Thirty-fourth Street, to Taylor-Fichter Steel Construction Co.
NEW YORK, 1200 tons, apartment building, 1 East End Avenue, to Levering & Garrigues Co.
NEW YORK, 700 tons, Methodist Episcopal Home at Spuyten Duyvil, to A. E. Norton, Inc.
NEW YORK, 400 tons, miscellaneous work for Interborough Rapid Transit Co., to Belmont Iron Works.
GARDEN CITY, N. Y., 800 tons, Adelphi College, to McClintic-Marshall Co.
GLENS FALLS, N. Y., 400 tons, building for Glens Falls Insurance Co., to McClintic-Marshall Co.
PENNSYLVANIA RAILROAD, 500 tons, bridge at Bridgeport, Pa., to McClintic-Marshall Co.
PENNSYLVANIA RAILROAD, 200 tons, bridges in western Pennsylvania, to American Bridge Co.
BALTIMORE, 250 tons, Park Bank addition, to Baltimore Steel Co.
BIRMINGHAM, 600 tons, power plant for

Alabama Power Co., to Virginia Bridge & Iron Co.
GREENSBURG, PA., 110 tons, tipples for Keystone Coal & Coke Co., to Jones & Laughlin Steel Corporation.
PITTSBURGH, 1100 tons, Pennsylvania Railroad produce yard buildings, to Jones & Laughlin Steel Corporation.
CLEVELAND, 150 tons, factory building for Eaton Axle & Spring Co., to Massillon Bridge & Structural Co.
CLEVELAND, 125 tons, factory building for Willard Storage Battery Co., to Massillon Bridge & Structural Co.
TOLEDO, OHIO, 500 tons, power plant for Henry L. Doherty & Co., to American Bridge Co.
CHICAGO, 3000 tons, tower on Palmolive-Peet Building, to American Bridge Co.
ST. LOUIS, 825 tons, express terminals for American Railway Express, to Mississippi Valley Structural Steel Co.
LINCOLN, NEB., 225 tons, Nurses' Home for St. Elizabeth Hospital, to St. Joseph Structural Steel Co., St. Joseph, Mo.
OMAHA, NEB., 650 tons, Joslyn Building, to Omaha Structural Steel Co.
GREAT FALLS, MONT., 600 tons, high school, to Minneapolis Steel & Machinery Co.
BENSON, ARIZ., 260 tons, bridge, to Virginia Bridge & Iron Co.
PHOENIX, ARIZ., 100 tons, high school auditorium, to Minneapolis Steel & Machinery Co.
SAN FRANCISCO, 165 tons, apartment building, Taylor and Jackson Streets, to Western Iron Works.
SAN FRANCISCO, 100 tons, apartment building on Eddy Street, to Golden Gate Iron Works.

Structural Projects Pending

Inquiries for fabricated steel work include the following:
NEW YORK, 16,600 tons, Reynolds Tower

Building at Forty-second Street and Lexington Avenue.
NEW YORK, 500 tons, miscellaneous work for Interborough Rapid Transit Co.
ITHACA, N. Y., unstated tonnage, plant industry building at Cornell University for New York State College of Agriculture.
STATE OF NEW YORK, 400 tons, highway bridges.
NASSAU COUNTY, N. Y., 400 tons, highway work.
PENNSYLVANIA RAILROAD, 500 tons, bridges.
ERIE RAILROAD, 200 tons, bridge at Rutherford, N. J.
WOODLYNNE, N. J., unstated tonnage, Woodlynne National Bank building.
PRINCETON, N. J., unstated tonnage, Joline and 1903 dormitories at Princeton University.
PLEASANTVILLE, N. J., unstated tonnage, senior high school; S. Hudson Vaughn, Atlantic City, N. J., architect.
ATLANTIC CITY, N. J., 160 tons, Park Lane Hotel; William Macy Stanton, Philadelphia, architect.
PHILADELPHIA, 800 tons, elevator wells for new Strawbridge & Clothier building; Turner Construction Co., New York, general contractor.
PHILADELPHIA, 590 tons; highway bridges at Sixth and Alleghany Streets, 375 tons, and at Ashdale Street, 100 tons, to Horridge, Elcock & Hall, general contractors; at Leverington Street, 115 tons, to Seeds & Durham, Philadelphia, general contractors.
PHILADELPHIA 1200 tons, Blackstone Hotel.
CAMDEN, N. J., unstated tonnage, factory building for Charles K. Cook Co., 211 South Second Street.
CLEVELAND, 4000 tons, Lakeside Hospital; bids close Aug. 15.
DETROIT, 1050 tons, Bell Telephone building.
CHICAGO, 1200 tons, building for General Electric Co., West Pershing Road and Ashland Avenue.
CHICAGO, 15,000 tons, Board of Trade Building.
CHICAGO, 1000 tons, power house for University of Chicago.
CHICAGO, 600 tons, store and loft building.
CHICAGO, 400 tons, Ashland Commercial Exhibit Building.
ST. LOUIS, 1200 tons, 18-story apartment building.
SAN FRANCISCO, 1400 tons, Pier 45; bids Aug. 15.
SAN FRANCISCO, 600 tons, power house for Great Western Power Co.; bids soon.
SAN FRANCISCO, 450 tons, hotel, Geary Street; bids being taken.
OAKLAND, CAL., 7200 tons plates, distributing mains for East Bay Municipal Utility District; bids Aug. 17.
PALO ALTO, CAL., 200 tons, telephone building; bids being received.
SACRAMENTO, CAL., 600 tons, office building; bids soon.
LOS ANGELES, 300 tons, apartment building on Whitely Avenue; bids being received.
LOS ANGELES, 320 tons, apartment building on South Serrano Street; bids being received.

The Electric Pig Iron Corporation, Canton, Ohio, has awarded the general contract to the Foundation Co., New York, for a ferrosilicon plant near Philo, Ohio, with initial unit 50 x 375 ft. in size, to cost about \$100,000. A contract has been made with Ohio Power Co. for power service from its generating station at Philo. Excavation has been started.

PERSONAL

ROBERT T. KENT, New York, has become manager of the sales and engineering departments of Divine Brothers Co., Utica, N. Y. Previous to making this connection Mr. Kent was general manager of the Bridgeport Brass Co., Bridgeport, Conn., and for several years before that engagement was superintendent of prison industries of New York, undertaking, at Governor Smith's request, the reorganization of these industries. Mr. Kent is editor and author of Kent's Mechanical Engineers' Handbook, and has been chairman of the A. S. M. E. committee on professional divisions, also for a time chairman of the management division. HOWARD E. BOARDMAN, Mr. Kent's predecessor at Utica, resigned recently to make a connection in New York in another line of business.

J. G. HEATH, vice-president Remington Arms Co., Inc., New York, has been placed in charge of the company's territory from Denver, Colo., to the Pacific Coast, and about Aug. 1 will establish headquarters at San Francisco. There will be no change in the Remington sales organization in the territory. Mr. Heath has been associated with the company during his entire business career, and in 1910 was made manager of the San Francisco office. In 1925 he was selected to head organization work in connection with the Remington Cash Register Co. and the following year became general sales manager for all products of that subsidiary.

W. H. GERHAUSER, recently elected president of the American Ship Building Co., Cleveland, has been made a director of the Union Trust Co. of that city.

JAMES F. MCCRORY, JR., until recently assistant manager Pittsburgh office, Eaton, Rhodes & Co., has become manager of sales for the Breck Fuel Co., Oliver Building, Pittsburgh.

W. R. HULBERT, sales manager of the thermit department, Metal & Thermit Corporation, 120 Broadway, New York, has resigned, and on Aug. 1 will become a member of the firm of Thomas H. & Milan H. Hulbert, 6 North Michigan Avenue, Chicago. He was graduated in mechanical engineering from Columbia University in 1904, and during the next three years was connected with the Power & Mining Machinery Co., the Rand Drill Co. and the Kobbe Co., New York. He went with the Goldschmidt Thermit Co. in 1907 as assistant engineer, and when the Metal & Thermit Corporation was formed in 1916 he was made sales manager of the thermit department. Mr. Hulbert will be succeeded by JOHN B. TINNON, since 1924 manager of the rail welding department.

Mr. Tinnon attended Vanderbilt University, Nashville, Tenn., and from 1908 until 1924 was identified with the electric railroad field.

SCOTT STEWART, president of W. J. Rainey, Inc., and vice-president of the Rainey-Wood Coke Co., 52 Vanderbilt Avenue, New York, was elected president and a director of the latter company at a recent board meeting. H. C. THOMAS, president Alan Wood Iron & Steel Co., Philadelphia, was elected vice-president and a director of the Rainey-Wood company; ALAN D. WOOD, vice-president and treasurer of the Alan Wood company, treasurer and a director, and H. R. AHRENS, secretary and treasurer of W. J. Rainey, Inc., secretary. R. A. RAINEY, chairman of W. J. Rainey, Inc., was also made a director of the coke company.

WILLIAM F. HARTMANN has retired from active service as treasurer of the Bethlehem Steel Corporation, New York, and its subsidiary companies. WILLIAM J. BROWN has been elected treasurer of the Bethlehem corporation, with offices at 25 Broadway, New York, and J. P. BENDER has been named treasurer of the Bethlehem Steel Co. and the Bethlehem Shipbuilding Corporation, Ltd., with offices at Bethlehem, Pa.

GEORGE L. ABBOTT, for the last 20 years associated with the Garlock Packing Co., Palmyra, N. Y., most recently as vice-president and general manager, has been elected president of the company, and has been succeeded by WARD K. ANGEVINE.

E. EVERETT GIBBS, formerly president Southern Can Co., Baltimore, which is now owned and operated by the Continental Can Co., Inc., New York, will continue with the Continental company as district representative at Baltimore.

MARTIN J. RYAN, for the last eleven months sales supervisor for the Northern New York Utilities, Inc., Utica, N. Y., has been appointed assistant sales manager of that company. He was formerly superintendent of the Giblin Foundries, of that city.

FOWLER MANNING has been appointed vice-president and general manager of L. C. Smith & Corona Typewriters, Inc., Syracuse, N. Y., and will take charge of the company's operations at Syracuse on Sept. 1. The position was created at the last meeting of the board, and in his new capacity Mr. Manning will relieve President FRANK R. FORD of many executive details.

LEWIS B. LINDEMUTH, of Carney & Lindemuth, consulting engineers, New York, left for Mexico on July 27 and will spend a month there as consultant for Cia, Fundidora de Fierro y Acero de Monterrey, S. A., Monterrey.

MARCUS T. DONAHUE has been appointed sales manager of the H. C. Atkins Mfg. Co., 2318 Randolph Street, St. Louis.

H. C. BECKWITH, for the last 12 years representative in the St. Louis district for the Trumbull Steel Co., Warren, Ohio, has been appointed St. Louis district representative for the Newport Rolling Mill Co., Newport, Ky., and for the West Leechburg Steel Co., Pittsburgh. His headquarters will remain at 1413 Chemical Building.

ANDREW R. JOHNSON, assistant New York district manager for the Republic Iron & Steel Co., has been appointed assistant general sales manager in charge of tin plate sales, with headquarters at Youngstown, succeeding AVERY C. ADAMS. Mr. Johnson was New York district sales manager for the Trumbull Steel Co. prior to its absorption by the Republic company.

WILLIAM L. FINGER, Ripley, Miss., has been appointed trade commissioner at Paris. Since May, 1926, he has been secretary to Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce, Department of Commerce.

GEORGE P. RHODES, president Colonial Steel Co., Pittsburgh, and IRVIN F. LEHMAN, vice-president Blaw-Knox Co., Pittsburgh, have been elected directors of the Pressed Steel Car Co.

JOHN M. ELLIS, New York district sales agent for the Bethlehem Steel Co., sailed July 28 for a several weeks' stay in Europe.

WILLIAMS C. DICKEY, New York representative of the Worth Steel Co., Claymont, Del., and other mills, will sail on the Berengaria Aug. 29 for a few weeks in Europe.

DONALD MACARTHUR, vice-president Seaboard By-Product Coke Co., Philadelphia, has, in addition to his present duties, been placed in general charge of the Philadelphia Coke Co., Philadelphia, a recently formed subsidiary of the Koppers Gas & Coke Co. W. H. EARLE, formerly in charge of the New York office of the Koppers Construction Co., will be manager of the new company; R. L. SPATZ, who has been a construction engineer for the Koppers Construction Co., will be assistant manager, and FRED DENIG, recently assistant superintendent of the operating department of the Construction company, will be superintendent. The coke plant now under

construction for the Philadelphia company will be placed in operation about Feb. 1, 1929.

ELLIOTT E. VAN CLEEF, 53 West Jackson Boulevard, Chicago, has been appointed district agent for the Roller-Smith Co., 233 Broadway, New York. MICHAEL B. MATHLEY, who has been connected with the company's Chicago office for a number of years, will be associated with Mr. Van Cleef.

WILLIAM HUNTER, who has been acting manager of the Philadelphia

office of the Niles-Bement-Pond Co. since the first of the year, was made manager of that office on July 1. He has been associated with the Niles company divisions for a number of years.

A. C. SHAND, for many years chief engineer of the Pennsylvania Railroad and more recently assistant to the vice-president in Philadelphia, retired Aug. 1. Mr. Shand, who was 70 years of age in July, has been connected with the railroad for about 49 years.

improving tendency in operations and an inclination on the part of customers to cover for forward business.

Bethlehem's Billing Price Rises

The Bethlehem Steel Corporation had net income in the second quarter of \$4,529,328, equivalent after dividends on preferred stock to \$1.57 a share on common. This compares with \$3,384,718 or 94c. a share on common in the preceding quarter and with \$5,048,680 in the second quarter last year.

In commenting upon the situation, President Eugene G. Grace stated that although the average billing price on all products during the last quarter was \$2 a ton less than in the June quarter last year, it was 53c. greater than in the preceding quarter. Operations during the second quarter averaged 82.5 per cent of capacity, compared with 79.5 per cent in the preceding quarter and with 75.6 per cent during the second quarter of 1927. "Current operations," he said, "are at a 75 per cent rate, as against 64 per cent in July, 1927. I look for a continuation of the increasing demand during the fall and winter and am also hopeful that the upward trend of price indicated by second quarter billings will continue."

The value of unfilled orders on hand June 30 was \$51,761,908, as compared with \$61,393,488 on March 31 and with \$48,655,757 on June 30, 1927.

Wheeling Makes Good Showing

Second quarter earnings of the Wheeling Steel Corporation amounted to \$1,530,125, as compared with \$1,024,213 in the preceding quarter and with \$855,936 in the June quarter last year. This company's half-year profits totaled \$2,554,338 in 1928 and \$1,848,186 in 1927.

Carrying the largest cargo ever transported on the Great Lakes, the steamer Carl D. Bradley tied up at the Buffington, Ind., harbor of the Universal Portland Cement Co. on July 27 with 16,033 gross tons of limestone. The Bradley used its own automatic electrical machinery to discharge its cargo at the rate of a ton a second.

Steel Company Earnings

Steel Corporation's for Second Quarter Were \$2.75 Per Share of Common Stock

EARNINGS of the United States Steel Corporation for the second quarter of 1928 were at the rate of \$2.75 per share of common stock, after providing for the preferred stock dividend, or substantially at the rate of the same quarter a year ago. The earnings of the first quarter were at a \$2.11 rate, so those for the first half of the year amount to \$4.86, against common stock dividend requirements of \$3.50, the regular 7 per cent rate, which was declared for the quarter just closed. In the second quarter of 1927, the common stock earnings were at a \$2.78 rate.

Total earnings were roughly \$6,000,000 greater in the June quarter than in the March quarter, but greater allowances were made for depreciation and the like, and the surplus for the quarter was \$7,110,428 against \$2,573,541 for the preceding quarter. The following tables show also the earnings of recent years:

EARNINGS IN RECENT YEARS			
Quarters	1928	1927	1926
1st	\$40,934,032	\$45,584,725	\$45,061,285
2nd	46,932,986	46,040,460	47,814,105
3rd	41,373,831	52,626,826	
4th	31,247,529	53,502,525	

EARNINGS FOR SECOND QUARTER		Total Earnings
April, 1928		\$13,927,481
May, 1928		16,646,845
June, 1928		16,358,660

Total earnings after deducting expenses, taxes and interest	\$46,932,986
Less, charges and allowances for depletion, depreciation and amortization, as follows:	
To subsidiary companies	\$13,614,451
To sinking funds on corporation bonds	2,889,634
	16,504,085

Net income	\$30,428,901
Deduct: Interest corporation bonds	\$4,045,422
Premium on bonds redeemed	514,721
	4,560,143
Balance	\$25,868,758
Dividends:	
Preferred, 1% per cent	\$6,304,919
Common, 1% per cent	12,453,411
	18,758,330
Surplus for the quarter	\$7,110,428

President James A. Farrell, at the conclusion of the meeting of the board of directors of the Steel Corporation, July 31, issued the following statement:

Our shipments of finished steel products in the second quarter equaled 84½ per cent of total mill capacity, compared with 86 per cent in the first quarter of 1928, and with 84 per cent in the second quarter of 1927. The tonnage of shipments in the June quarter this year actually exceeded in total the tonnage shipped in the corresponding quarter in 1927.

The slightly higher selling prices netted in the second quarter, with improved operating costs, together with the receipt of income from seasonal business, account for the increase of 14½ per cent in reported earnings for the second compared with the first quarter of 1928, notwithstanding the volume of steel shipments, was slightly less.

Since July 1 operations of the mills have been slightly below the average for the second quarter, influenced somewhat by the slackening in pace arising from hot weather. The demand for steel as evidenced by new business being booked points to a very fair degree of operations, due consideration being given to general trade conditions, during the remainder of the summer and early fall.

Apart from the foregoing there are no features of special interest in the steel situation other than that business is proceeding as usual with an

Bethlehem's Comparative Income Account Over Four Years

	1928	1927	1926	1925
Total inc.	\$10,767,959	\$11,219,069	\$12,096,033	\$9,708,528
Int. disc., etc.	2,841,636	2,869,023	3,606,224	3,301,768
Depr. and depl.	3,396,995	3,301,366	3,141,786	2,983,569
Net income	\$4,529,328	\$5,048,680	\$5,348,023	\$3,423,191
Pfd. divs.	1,697,500	1,697,500	1,672,720	1,075,791
Surplus	\$2,831,828	\$3,351,180	\$3,675,303	\$2,347,400
Six months ended June 30:				
Total inc.	\$20,342,907	\$22,976,358	\$24,069,071	\$20,107,844
Int. disc., etc.	5,679,781	5,752,981	6,671,256	6,639,363
Depr. and depl.	6,749,080	6,556,659	6,183,942	5,973,774
Net income	\$7,914,046	\$10,666,718	\$11,213,873	\$7,494,707
Pfd. divs.	3,395,000	3,395,000	3,361,515	2,151,428
Surplus	\$4,519,046	\$7,271,718	\$7,852,358	\$5,343,279

Machinery Markets and News of the Works

Large Orders Placed in East

Wright Aeronautical Corporation, Paterson, N. J., Buys \$200,000 Worth of Turret Lathes and Milling Machines—July Business Good

JULY machine tool business in the entire country has averaged well up to the June total, while in the New York district some sellers who shared in the large orders placed by the Wright Aeronautical Corporation, Paterson, N. J., have had the best month of the year, and, in fact, the best month in several years.

The Wright Aeronautical Corporation bought upward of \$100,000 worth of milling machines and close to that amount in turret lathes. Its purchases of other tools also were considerable. In addition, the orders being placed by the General Electric Co. have swelled the month's sales.

At Cincinnati, Cleveland and Chicago sales fell somewhat below the totals for June, but were much better than the average for July. Railroad buying is light, but a fair amount of business is pending in the Detroit automobile district, especially in high production tools. Orders from miscellaneous industries make up the bulk of current business.

The Gabriel Snubber Mfg. Co., Cleveland, is to bring out a new hydraulic shock absorber for automobiles and probably will purchase additional equipment. The International Harvester Co. will build a caterpillar-type tractor in its Chicago works, and considerable new shop equipment will be needed. The Waukesha Motor Co., Waukesha, Wis., which is building a large addition to its plant, has bought a number of multiple spindle drilling machines and is still in the market for milling and drilling equipment. The Spicer Mfg. Corporation has bought additional machinery for its Toledo, Ohio, plant.

The Chicago Board of Education has issued a large list of equipment to be purchased for schools, bids to close Aug. 2.

New York

NEW YORK, July 28.—Large orders placed by the Wright Aeronautical Corporation, Paterson, N. J., eclipsed all other business done in the local machine tool market the past week. The Wright company's orders for milling machines and turret lathes alone well exceeded \$200,000, and other orders for miscellaneous tools were given out. Early deliveries were stipulated so that the new unit of the Wright plant can be put in production by Sept. 1 or shortly thereafter. Additional inquiries were received by the machine tool trade from the General Electric Co., which has been buying quite heavily for its refrigerator manufacturing departments at Schenectady and Erie. The Wright orders, together with a fairly good demand from scattered sources for single tools, will bring up July sales for many sellers in this district to the largest monthly total of the year. In a few instances it will be the largest month since the war. One turret lathe order amounted to \$70,000,

while a milling machine order totaled about \$60,000 and another was about \$50,000.

Sales of Niles-Bement-Pond Co. during the week included a 5-ft. and a 6-ft. radial drilling machine and a 73-in. boring mill. Pratt & Whitney division sold four lathes, two vertical shapers and two profiling machines.

Plans are under way by American Can Co., 120 Broadway, New York, for new factory branch and distributing plant at Denver, Colo., to cost close to \$200,000 with equipment; proposed to begin work about middle of August. Later, company is said to be planning main manufacturing unit at same location, to cost upward of \$750,000 with machinery. Company engineering department is in charge.

Officials of Dempsey Furnace Co., 525 Sixth Avenue, New York, have organized new company of same name to take over and expand present concern, and will increase production in line of industrial furnaces.

Farber & Kalkin, 1746 Pitkin Avenue, New York, architects, have filed plans for one-story automobile service, repair and garage building, 100 x 200 ft., to cost close to \$100,000 with equipment.

Central Foundry Co., 1434 Fulton Street, Brooklyn, has asked bids on general contract for new two-story branch storage and distributing plant at Forest Hills, L. I., to cost approximately \$40,000. Bly & Hamann, 551 Nostrand Avenue, are architects.

Northern Westchester Lighting Co., Ossining, N. Y., is having plans drawn for two power substations to cost approximately \$175,000 with equipment. Thomas E. Murray, Inc., 55 Duane Street, New York, is architect and engineer.

R. Hoe & Co., Inc., 504 Grand Street, New York, manufacturer of printing presses and parts, saws, etc., has purchased former plant of De La Vergne Machine Co., manufacturer of refrigerating equipment, fronting on East River, from 137th to 138th Street, and will remodel for new plant. Present business will be removed to new location and additional machinery provided for increase in output, particularly in connection with new model of newspaper printing press. Company is reported considering removal of branch plant at Dunellen, N. J., to new site, concentrating all production at that location.

DeYoung & Moscowitz, 11 East Forty-fourth Street, New York, architects, will soon take bids on general contract for five-story automobile service, repair and garage building, to cost approximately \$125,000 with equipment.

H. Muehlstein & Co., 41 East Forty-second Street, New York, Herman Muehlstein, head, manufacturer of rubber products, has acquired former machine and erecting shop of Erie Railroad Co. at Jersey City, N. J., and will remodel for new branch plant.

Sterling Casket Hardware Co., 5851 Grand Avenue, Maspeth, L. I., George R. Bailey, president, has awarded general contract to Eugene F. Warwick, Crescent Plaza Building, Long Island City, for one-story plant, 82 x 100 ft., to cost close to \$30,000 with equipment. Harry R. Harvie, 370 Seventh Avenue, New York, is architect.

Stern & Peyser, 12 East First Street, Mount Vernon, N. Y., architects, have plans for a two-story automobile service, repair and garage building, to cost \$100,000 with equipment.

Fire, July 22, damaged portion of factory of Noma Electric Corporation, 334-44 Hudson Street, New York, manufacturer of lighting equipment, fixtures, etc.

Lackawanna Railroad Co., 90 West Street, New York, plans installation of elevating, conveying and other freight-handling equipment, in group of warehouse and distributing buildings to cover six blocks at Jersey City, N. J., to cost close to \$14,000,000. Work is scheduled to begin soon. Engineering department of company is in charge.

Water Committee of Board of Trustees, South Orange, N. J., will receive bids until Aug. 15 for multiple unit zeolite water-softening plant for municipal waterworks, with complete mechanical accessories. Plans and specifications at

The Crane Market

NOT much new inquiry has appeared in the past week, either for overhead or locomotive cranes, but sellers are busy with a fair number of inquiries that have been in the market for some time. No action has been taken as yet on the cranes and steam shovels for export inquired for by Dwight P. Robin-

son & Co., New York, some time ago. Fox Brothers International Corporation, New York, will probably be in the market before long for some locomotive cranes for use in Turkey.

Among recent purchases are:

L. W. & P. Armstrong, 96 Wall Street,

New York, two 30-ton, 50-ft. span overhead cranes with two 15-ton trolleys for Centrale Fajardo at Fajardo, Porto Rico, from Whiting Corporation.

Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., 25-ton hand power crane for power station from unnamed builder.

office of Ira T. Redfern, Village Hall, village engineer.

Hanson-Van Winkle-Munning Co., 324 Chestnut Street, Newark, comprising recent merger of Hanson-Van Winkle Co., Newark, and A. P. Munning & Co., Matawan, has purchased plant of Wickham Co., adjoining Munning plant at Matawan, recently vacated when company removed to Springfield, Ohio. New owner will remodel for expansion. It is purposed to build an addition later and concentrate larger part of production at that location.

Board of Public Works, Paterson, N. J., Edward Dupree, city clerk, is asking bids until Aug. 14 for power house for municipal refuse destructor plant, comprising turbo-generator, pumps, feed water heater, air compressors, pressure release tank, deep well air lift water system, valves and complete accessories. Plans and specifications at office of city engineer, City Hall.

Plant formerly occupied by R. Newman Hardware Co., St. Francis and East Ferry Streets, Newark, has been purchased by Rauchbach-Goldsmith Co., 9 St. Francis Street, manufacturer of metal trunks, etc. Property totals about 150,000 sq. ft. floor space, and will be used in part for expansion.

Newark Steam Heating Co., Newark, has purchased two-story factory at 131-33 South Twelfth Street, and will remodel for new plant.

International Metal Bed Co., 1-17 St. Francis Street, Newark, has been formed to manufacture metal beds. It will be in market for materials and equipment, particularly metal tubing, and will carry on all manufacturing operations except making of tubing.

W. B. Connor Co., Brooklyn, manufacturer of air filters, steam traps, pumps, etc., has leased, with option to purchase, 6½ acres at Lincoln Park, N. J., improved with factory building, 60 x 200 ft.

Doehler Furniture Co., Inc., Brooklyn, has been organized as subsidiary of Doehler Die Casting Co. to manufacture metal furniture, parts of which will be die-cast. All manufacturing will be done in plants of parent company.

Engineering Service Corporation, 943 Broadway, Albany, N. Y., has been formed to carry on engineering and research work including designing of mechanical devices and evolving plans for production cost reduction. Company has complete chemical and physical laboratories, testing equipment and machine shop facilities.

New England

BOSTON, July 30.—Contrary to earlier reports, the city of Boston has purchased no tools against its Hyde Park district school list. Machine tool dealers have refused to guarantee deliveries of

tools on specified dates. Bids close today on miscellaneous wood-working tools.

Kingsbury Machine Co., Keene, N. H., has started work on a plant addition.

Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., is erecting machine shops, to cost with equipment \$130,000.

Leo Shlick, 314 Beacon Street, Boston, architect, has taken bids on a one-story 80 x 200 ft., addition for A. L. Adams Paper Co., Templeton, Mass., for which motors and other equipment are needed.

Plans are nearing completion for a one-story and sub-basement, 50 x 225 ft., addition for Metal Craftsman, Inc., 141 Georgia Avenue, Providence, R. I.

General Electric Co., River Works, West Lynn, Mass., has completed plans for a two-story, 20 x 100 ft., power house addition. Mr. Trudinger, 920 Western Avenue, Lynn, is in charge.

Plans have been drawn by H. T. McCluskey & Sons, Inc., Grand Avenue, New Haven, Conn., manufacturer of wire goods, for one-story addition, 40 x 62 ft., reported to cost about \$23,000 with equipment. Dwight E. Smith, New Haven, is architect.

Following recent purchase of plant and business of Fall River Spindle Co., Fall River, Mass., manufacturer of cotton mill machinery, etc., by Norlander Machine Co., New Bedford, Mass., latter company has leased property at Spartanburg, S. C., for Southern branch plant, to be devoted largely to parts production and repair work. Machinery from Fall River plant will be removed to new location and additional equipment provided. John Price, Sr., former owner of Fall River company, will be manager at Spartanburg.

A. D. Windle Co., Howe Avenue, Millbury, Mass., operating a local woolen mill, is reported contemplating a new power plant to cost close to \$50,000 with equipment.

J. M. Carpenter Tap & Die Co., Pawtucket, R. I., has been organized with capital of \$150,000 to take over and expand local company of same name with plant at 20 Newell Avenue, specializing in production of taps, dies, reamers and kindred metal cutting tools. New incorporators include R. S. Carter and A. H. Commins.

Peoples Hydro Electric Vermont Corporation, Montpelier, Vt., has begun work on hydroelectric generating plant on Winooski River, near Montpelier, to cost in excess of \$175,000 with equipment; extensions will be made in transmission lines.

Swaine Iron Works, Springfield, Mass., has acquired plant and business of Springfield Stamping & Tool Co., Inc., and will consolidate with its organization. New owner is reported planning continuance of production at Springfield works as branch plant.

Hartford Electric Light Co., Hartford, Conn., has awarded general contract to Industrial Construction Co., 721 Main

Street, for extensions and improvements in power plant, to cost more than \$40,000 with equipment.

Maine Steel Products Co., Portland, Me., recently organized to take over and consolidate Marine Hardware Equipment Co., Portland, and Bangor Iron Works, Bangor, Me., has begun operations at Portland mill and will devote initial output largely to production of improved type of steel snow plows, including parts and assembling.

Cadillac-LaSalle Co., Providence, R. I., operated by Cadillac Investment Co., Milton J. Budlong, head, local representative for Cadillac and LaSalle automobiles, plans early construction of new service, repair and sales building, to cost in excess of \$350,000 including equipment.

Kimball Aircraft Corporation, Naugatuck, Conn., has been formed to manufacture airplane motors. It has a local plant and will be in market for materials and equipment.

Pittsburgh

PITTSBURGH, July 30.—The Westinghouse Electric & Mfg. Co. is ordering steadily against its third quarter tool list, but this buying constitutes the principal activity in point of sales, which in general are adversely affected by the vacation period. Inquiries are numerous, however, and the trade takes hope, from the high rate of steel plant engagement for this time of year, that they will develop into actual business later.

Plans are being arranged by Pennsylvania Railroad, Pittsburgh, for new engine house with repair facilities, yard and terminal improvements, at Benwood, W. Va., to cost close to \$200,000 with equipment. Company is arranging expansion and improvement program in Pittsburgh district to cost close to \$40,000,000, including produce terminal, with cold storage and refrigerating division, and freight terminal, with elevating, conveying and other equipment. Last two noted projects are each reported to cost more than \$1,000,000.

Pittsburgh Plate Glass Co., Frick Building, Pittsburgh, has approved plans for four-story addition to plant at Clarksburg, W. Va., 150 x 390 ft., to cost more than \$300,000.

General Benzol Corporation, Warren, Pa., recently organized by A. L. Sleeman and associates, with capital of \$500,000, has purchased property of Warren Refining Co., whose plant in Venturatown district, was destroyed by fire more than a year ago. New owner plans construction of oil refinery to cost upward of \$200,000 with equipment; additional units will be added later.

Pennsylvania Transfer Co., 298 Duquesne Way, Pittsburgh, has awarded general building contract to Nicola Building Co., 6388 Penn Avenue, for one-story

automobile service, repair and garage building to cost approximately \$85,000 with equipment. J. P. McWilliams, 126 North Highland Avenue, is architect.

Pittsburgh Screw & Bolt Co., 2719-41 Preble Avenue, Pittsburgh, has filed plans for extensions and improvements in plant to cost about \$24,000.

John C. Neals, Sewickley, Pa., and associates have organized Altithermo Engineering Co., to establish and operate a plant for manufacture of gas machinery and appliances. L. B. Cuddy, Sewickley, will also be an official of company.

Trojan Steel Co., 322 South Avenue, Charleston, W. Va., will take over plant and property of Becker Steel Co., South Charleston, W. Va., recently acquired at public sale by R. M. Venable, Charleston, and associates. New owner plans improvements and will begin production soon.

Board of Education, Lewistown, Pa., is said to be planning installation of manual training equipment in two-story addition to junior high school to cost about \$160,000, for which bids will soon be asked on general contract. Hersh & Shollar, Commerce Building, Altoona, Pa., are architects.

H. Bettis Co., Inc., Wheeling, W. Va., manufacturer of wirebound barrels, boxes, etc., has acquired a factory at Zanesville, Ohio, and will remodel for branch plant, to cost close to \$100,000 including machinery. Company is said to be planning for further expansion at Zanesville.

South Atlantic

BALTIMORE, July 30.—Work will soon be started by Asiatic Petroleum Co., Ltd., 65 Broadway, New York, on new oil refinery and storage and distributing plant in Fairfield district, Baltimore, where property recently was acquired. Project will include one unit for asphalt refinery, and will cost about \$1,000,000.

Highland Motor Sales Co., 3415 Eastern Avenue, Baltimore, has revised plans for two-story service, repair and garage building, to cost more than \$80,000, for which bids will be asked on general contract early in September. R. C. Brockmeyer, 1665 North Milton Avenue, is architect.

American Oil Co., American Building, Baltimore, will soon take bids on general contract for one-story oil storage and distributing plant at Dunmore, Pa., to cost upward of \$75,000 with equipment.

Board of District Commissioners, District Building, Washington, will receive bids until Aug. 8 for steel shelving, cases, etc., for new McKinley high school.

American Chatillon Corporation, 393 Seventh Avenue, New York, has approved plans for one-story power house and machine shop at rayon mill at Rome, Ga. Entire project will consist of seven manufacturing units to cost approximately \$3,500,000 with machinery. Lockwood, Greene & Co., 1 Pershing Square, New York, and Greenville, S. C., are architects and engineers.

Chesapeake & Ohio Railroad Co., Richmond, Va., will make an expenditure of close to \$10,000,000 for expansion in locomotive and car repair facilities, instead of smaller sum previously noted in these columns, to be carried out in connection with general development program aggregating \$21,144,724. Shop work will include new locomotive construction and repair units at Huntington, W. Va., to cost \$3,500,000 with equipment; improvements and extensions

in shops at Richmond to cost \$1,000,000; additions to locomotive shops at Clifton Forge, Va., including equipment, to cost about \$1,000,000; extensions to shops at Hinton, W. Va., including track facilities, to cost \$1,260,000; new engine terminal with shop facilities at Cincinnati, to cost \$2,300,000 with machinery; and new engine house, with repair facilities, at Ashland, Ky., to cost \$500,000. Work on program will begin soon.

City Council, Baltimore, plans early acquisition of about 1000 acres as site for municipal airport, to include hangars, repair and reconditioning shops, oil storage and distributing buildings, and other units, to cost more than \$500,000. Charles F. Goob is city engineer in charge.

Master Auto Repair Co., Charleston, S. C., recently organized by Arthur L. Way, 67 Reid Street, and associates, plans early establishment of machine repair shop, with facilities for parts manufacture, etc.

Southern Spring Bed Co., 290 Hunter Street, Atlanta, Ga., has awarded general contract to Padgett & Sutton, Bona Allen Building, for two-story plant unit, 100 x 122 ft., to cost about \$26,000 with equipment. Hentz, Adler & Schutze, Candler Building, are architects.

Paul A. Bennett Motor Co., 614 Trade Street, Winston-Salem, N. C., has leased two-story and basement building, 75 x 200 ft., to be erected at Sixth and Marshall Streets, for service, repair and garage unit, to cost close to \$100,000 with equipment.

Whitney Mfg. Co., Whitney, S. C., has approved plans for enlargements in machine shops and pumping plant at its textile mill, and will install additional equipment.

Farmville Furniture & Cabinet Co., Farmville, Va., has approved plans for first unit of new plant, consisting of two one-story factories, each 50 x 250 ft., to cost close to \$80,000 with equipment. Other units will be built later.

Conveying machinery and other handling equipment, factory trucks and tractors, etc., will be installed in new storage and distributing plant to be built by Public Improvement Commission, Munsey Building, Baltimore, to cost about \$570,000. J. E. Greiner, Lexington Building, is engineer.

Allen C. Davis, 121 South Howard Street, Baltimore, is at head of project to establish plant for manufacture of light aircraft. Arrangements are being made to lease building for parts production and assembling. A company will be organized to carry out enterprise.

Eanes Mfg. Co., Asheville, N. C., has been formed to manufacture Eanes weavers' knotter for textile makers. Device is at present being made under contract.

Babcock & Wilson Co. has completed plans for construction at Augusta, Ga., of a refractories plant, which will eventually represent an investment of more than \$1,000,000. A site was recently purchased on Georgia & Florida Railroad tracks and work upon first unit will be started soon. Machinery for plant will be built by company itself.

Philadelphia

PHILADELPHIA, July 30.—York Ice Machinery Co., Belmont and Thompson Streets, Philadelphia, manufacturer of ice-making and refrigerating ma-

chinery, has awarded general contract to Cramp & Co., Denckla Building, for three-story and basement addition, to cost \$115,000 with equipment. Main plant and headquarters are at York, Pa.

Branch-Crawford Co., 1539 Wood Street, Philadelphia, manufacturer of pipe hangers and kindred products, has asked bids on general contract for addition, to cost more than \$30,000 with equipment. Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

Philadelphia Steam Co., care of Frank M. Hunter, Gibson Building, Chester, Pa., recently organized, has applied to city council, Philadelphia, for permission to construct steam power plant for central heating service, with initial capacity of about 100,000 hp. Company is arranging for bond issue of \$5,500,000 to provide for plant. Edward H. Reuss, Merion, Pa., is president.

Following recent acquisition of Federal Container Co., Fifty-sixth Street and Paschall Avenue, Philadelphia, by Fiber Board Products, Inc., San Francisco, purchasing company is having plans prepared for a new paperboard mill in vicinity of Philadelphia, to be operated by Federal branch. It will cost in excess of \$450,000 with machinery. Federal company will continue under management of T. C. Mitchell, formerly president.

Philadelphia Garage Co., Carlisle and Cherry Streets, Philadelphia, has awarded general contract to Goler Construction Co., 1600 Arch Street, for extensions and improvements in seven-story service repair and garage building to develop capacity for 1000 cars, to cost close to \$100,000.

Sears, Roebuck & Co., Roosevelt Boulevard, Philadelphia, operating a mail order business with headquarters at Chicago, has had plans drawn for three additional units at local factory branch and distributing plant, to be four stories and basement, 85 x 126 ft.; one story and basement, 85 x 105 ft.; and one story and basement, 40 x 84 ft., to cost more than \$400,000 with equipment. Nimmons, Carr & Wright, 122 South Michigan Avenue, Chicago, are architects.

New Matix Equipment Co., Philadelphia, care of John D. Lawrence, president, Board of Trade, Westville, N. J., recently organized by L. H. Meyers, Philadelphia, and associates, has acquired property at Westville for new plant to manufacture air brakes and kindred products. Initial unit will be one story, and cost more than \$25,000 with equipment.

Middlesex Paper Tube Co., Lowell, Mass., has leased portion of former plant of Mercer Automobile Co., Trenton, N. J., for new branch factory for manufacture of paper tubing, cardboard containers, etc.

City Council, Atlantic City, N. J., has plans for municipal airport expansion at Bader Field, including two steel hangars, with repair and reconditioning facilities, to cost close to \$50,000.

Norman Aircraft Co., care of Jacob Rosenfeld, High Street, Burlington, N. J., recently organized with capital of \$100,000, by Ohio interests, headed by J. W. Overturf, Cleveland, has acquired factory property at Stacy and Barclay Streets, for new plant for manufacture of airplanes. It is understood that an existing works will be removed to this location and additional equipment provided for parts and assembling.

Board of Water Commissioners, Wilmington, Del., has plans for extensions and improvements in municipal waterworks, including central pumping plant on Brandywine River. A fund of \$3,000,000 has been arranged for entire project.

W. Compton Wills is assistant engineer of water department.

Philadelphia Coke Co., Richmond and Kennedy Streets, Philadelphia, has filed plans for one-story manufacturing unit at artificial gas plant, now in course of construction, to cost \$105,000. Entire project will cost more than \$750,000.

Board of Education, Upper Darby, Pa., plans installation of manual training equipment in new three-story high school to cost \$750,000, for which bids are being asked on general contract until Aug. 8. Heacock & Hokanson, 1211 Chestnut Street, Philadelphia, are architects.

Hercules Powder Co., Wilmington, Del., is said to have plans under way for new unit at plant at Carthage, Mo., for production of nitric acid, to be operated under an ammonia oxidation system, to cost close to \$300,000 with equipment.

Nevin Bus Terminal Co., Philadelphia, has engaged W. F. B. Koelle, 112 South Sixteenth Street, architect, to prepare plans for seven-story service, repair and terminal garage on site recently acquired, to cost close to \$500,000 with equipment.

American Steel Engineering Co., 3520 Queen Lane, Philadelphia, dealer in reinforcing steel, structural steel, rolling steel doors and other steel building products, has completed new shop, warehouse and office building at above address.

Detroit

DETROIT, July 30.—Cyclone Fence Co., Waukegan, Ill., has purchased Anthony plant of American Steel & Wire Co., Tecumseh, Mich., and will remodel for production of wire screens, wire cloth, etc. It is planned to begin operations early in fall.

Commonwealth Brass Corporation, 5781 Commonwealth Avenue, Detroit, is planning expansion and will install additional equipment.

Plant No. 1 of Rickenbacker Motor Co., Detroit, has been sold by Security Trust Co., 735 Griswold Street, receiver, to James Holden, Detroit, real estate dealer, acting for a company whose name is temporarily withheld, for a price of \$600,000, subject to approval of court. Receiver's sale of plant No. 2 of Rickenbacker company is scheduled for Aug. 2.

Grand Rapids Metalcraft Corporation, Grand Rapids, Mich., is arranging for an expansion program to include manufacture of new products for automobile service. Exclusive rights have been secured for manufacture of ventilating heater invented by J. W. Kelch, Detroit, and plant unit will be established exclusively for this output. Other departments soon to be operated include those for production of instrument panels, door trim panels, furniture stampings, cowl bars, ash receivers and metal furniture parts.

United States Gypsum Co., 200 West Adams Street, Chicago, has plans for new mill at Detroit for manufacture of gypsum building products, to cost more than \$400,000 with machinery. Plant will be operated in conjunction with other new mill to be built at East Chicago, Ind.

Plant of Jewett Radio Corporation, Telegraph Road, Pontiac, Mich., has been acquired by Baxter Laundries, Inc., Pontiac, and will be remodeled for new mechanical laundry, to cost about \$100,000 including automatic machinery, steam power equipment, etc.

Detroit Edison Co., 2000 Second Boulevard, Detroit, has filed plans for new two-story and basement power substation, to cost about \$350,000 with machinery.

Board of Education, Pontiac, Mich., is considering installation of manual training equipment in new junior high school to cost close to \$500,000, for which bids will be asked on general contract early in August. Malcolmson & Higginbotham, 1219 Griswold Street, Detroit, are architects.

Pontiac Foundry & Machine Co., Pontiac, Mich., has been organized to manufacture non-ferrous castings, wood and metal patterns, dies, tools, jigs, fixtures, etc., and do general machine work. Company has purchased factory building at Dixie Highway and Scott Lake Road, Pontiac, and will do no additional building.

Lenert Aircraft Co., Pentwater, Mich., has been organized to manufacture airplanes of duralumin, chrome molybdenum steel tubing and flat stock.

Newaygo Portland Cement Co., Charlevoix, Mich., will begin work immediately on a plant to cost \$1,000,000.

Cleveland

CLEVELAND, July 30.—The machine tool market made a fair showing for July. While dealers' sales fell off the past week, volume during the month was about equal to that in June. Orders taken by a local turret lathe manufacturer were far ahead of June. Demand is still confined almost wholly to single machines and is well distributed between various industries. Considerable business in single tool inquiry is pending. Much of the demand is for replacement tools to reduce cost of operations.

Gabriel Snubber Mfg. Co., Cleveland, is planning to bring out a new hydraulic shock absorber for automobiles and it is understood will purchase some machinery equipment. Spicer Corporation has purchased additional machinery for its Toledo plant. Timken Roller Bearing Co., Canton, during the week bought a lathe and Diebold Safe & Lock Co., Cleveland, a radial drill.

Plans have been filed by Willys-Overland Co., Toledo, Ohio, for one-story addition to automobile plant, to be used primarily in connection with export production division, to cost about \$250,000.

New York Central Railroad Co., Ohio Central Lines, Cleveland, plans extensions and improvements in docks and terminal at Toledo, Ohio, including a new electrically-operated car-dumping plant and other mechanical terminal facilities, to cost in excess of \$1,000,000. J. R. Scofield, Toledo, is resident engineer in charge.

Vulcan Corporation has been organized by officials of Vulcan Last Co., Portsmouth, Ohio, manufacturer of iron shoe lasts, etc., to take over and expand company. New company has arranged for preferred stock issue of \$2,500,000, a portion of proceeds to be used for extensions. W. J. Burke is president.

Winton Engine Works, Inc., 2116 East 106th Street, Cleveland, is considering plans for two one-story buildings, to cost more than \$50,000 with equipment.

Vilchek Tool Co., 3000 East Eighty-seventh Street, Cleveland, has awarded general contract to Hunkin-Conkey Construction Co., for two one-story additions, 40 x 100 ft., and 30 x 60 ft., to cost about \$40,000 with equipment.

Glenn L. Martin Co., 16800 St. Clair Avenue, Cleveland, manufacturer of airplanes and parts, has engaged Small & Rowley, Terminal Tower Building, archi-

tecs, to prepare plans for new plant at Baltimore, at municipal airport to be established by that city, with initial units for parts production and assembling to cost more than \$500,000.

National Air Transport, Inc., Cleveland Airport, Cleveland, is planning construction of new steel hangar, 100 x 120 ft., with repair and reconditioning facilities, to cost in excess of \$75,000, with equipment.

Standard Oil Co. of Ohio, Cleveland, has work under way on new gas absorption plant at local refinery, for reclaiming of gases formed during distillation process, to cost \$50,000 with equipment. Construction has also been started on similar unit at Toledo, to cost a like sum.

Commercial Steel Casting Co. has been formed as sales organization for steel casting division of Osgood Co., Marion, Ohio, which was recently consolidated with former Commercial Steel Casting Co.

Superior Metal Spinning & Mfg. Co., 132 Ontario Street, Toledo, Ohio, has been incorporated to take over business formerly operated by M. W. and J. F. Biringer. Company spins all kinds of metal and specializes in stainless steel, monel metal and non-ferrous products. It is building factory on Fitch Road, West Toledo, and will be in market for some equipment.

Additions to factory buildings and equipment now being made will more than double the present productive capacity of Bunting Brass & Bronze Co., Toledo, Ohio.

Buffalo

BUFFALO, July 30.—Property has been acquired by Kittinger Co., 1893 Elmwood Avenue, Buffalo, manufacturer of furniture, at Los Angeles, for Pacific Coast plant, for which plans will soon be drawn. Initial unit will be one story, aggregating about 400,000 sq. ft. floor space, and is reported to cost more than \$850,000 with machinery. Work will be started immediately on two-story factory branch and distributing plant, totaling about 35,000 sq. ft. of floor space, to be used preliminary to completion of main plant, to cost close to \$100,000. Herbert C. Emmons, 1100 South Oakland Street, Pasadena, Cal., is Los Angeles representative.

An aircraft company to specialize in production of English-type De Havilland-Moth airplanes is in negotiation with Chamber of Commerce, Buffalo, relative to site for new plant, and arrangements are expected to be concluded soon for land on Werle Road. Samuel B. Botsford, general manager, Chamber of Commerce, is in charge of negotiations.

Sun Oil Co., Finance Building, Philadelphia, is said to have authorized plans for construction of storage and distributing plant and office building at Syracuse, N. Y., to replace works recently destroyed by fire, with loss close to \$100,000.

Plans have been filed by Palace Laundry Co., Tenth and Pine Streets, Niagara Falls, N. Y., for one-story steam power plant at Lockport, N. Y., to cost close to \$55,000 with equipment.

James A. Louster and Paul H. Williams, Cazenovia, N. Y., have organized Diepress Co., with capital of \$400,000, to establish local plant for manufacture of dairy machinery and kindred equipment. Operations will begin at early date.

Brockway Motor Truck Corporation, Cortland, N. Y., has authorized plans

for one-story addition, to cost close to \$90,000 with equipment. C. W. Clark, Savings Bank Building, is architect.

Gould Paper Co., Lyons Falls, N. Y., plans rebuilding of portion of mill at Gouldtown, near Lyons Falls, destroyed by fire July 20, with loss approximating \$100,000 including equipment.

Art Work Shop, 828 East Ferry Street, Buffalo, manufacturer of automobile hardware and art metal goods, has filed plans for one-story addition to cost about \$24,000 including equipment.

Precise Products, Inc., Rochester, N. Y., recently organized by Ernest L. White, 60 Brunswick Street, and associates, plans operation of local plant for manufacture of tools, dies and kindred products.

Chicago

CHICAGO, July 30.—Machine tool orders in the past month have been heavier than usual for July, although lighter than in June. Demand is still considered active, although there has been an appreciable decline in inquiries in the past two weeks—a development that is not surprising in view of the vacation season.

Waukesha Motor Co., Waukesha, Wis., which is building a plant addition, has bought a number of multiple spindle drills and is still in the market for special milling and drilling equipment. International Harvester Co., Chicago, has decided to build a caterpillar-type tractor in its local tractor works. Considerable new equipment will be needed for production of this model. Link-Belt Co., Chicago, which is building an addition in this city, is in the market for a few machine tools. J. I. Case Threshing Machine Co., Racine, Wis., which has been a liberal buyer of machine tools in the past half year, has placed orders for two automatic lathes.

Chicago, Burlington & Quincy Railroad has bought an axle lathe and is about ready to close on a few more tools. Missouri-Kansas-Texas recently bought a few machine tools and will soon purchase the remainder of the items on its outstanding list. Missouri Pacific has indefinitely postponed action on inquiries that have been before the trade for some time. Chicago & North Western has issued an inquiry for a Marshalltown motor-driven throatless shear with circle-cutting attachment.

Chicago Board of Education has placed orders for a 16-in. x 6-ft. lathe and a cutter grinder for Washburn Vocational School. Board has also issued inquiries for equipment needed in various junior high schools. Bids on this equipment are to be in on Aug. 2. A list of the more important items follows:

Three motor-driven, 2-wheel dry grinders with 10-in. grinding wheels.

Three motor-driven No. 20 Stanley single-spindle plain-bearing floor-type drilling machines.

Three 11-in. x 4-ft. motor-driven engine lathes.

Three Yates-American motor-driven 30-in. band saws.

Three Yates-American motor-driven No. 1146 two-wheel dry grinders with 1½ x 10-in. grinding wheels.

Three Yates-American motor-driven No. 1, 6-in. bench jointers.

Twelve Yates-American, or equal, No. 12 motor-in-head lathes.

Three Pexto No. 3 squaring shears.

Six Pexto No. 63 bar folders.

Three Pexto No. 1005 cornice brakes.

Three motor-driven 1½ x 10-in. buffers and grinders.

Dallas Brass & Copper Co., 6601 West Grand Avenue, Chicago, has awarded

contract for a one-story plant building, 56 x 320 ft., to cost \$20,000.

Miehle Printing Press Mfg. Co., 1332-58 Damen Street, has awarded a contract for a plant building, 200 x 263 ft., to cost \$450,000.

Trindl Corporation, manufacturer of automobile engine parts, 2917 Wabash Avenue, Chicago, has awarded contract for a one-story plant, 125 x 235 ft., at Aurora, Ill., to cost \$55,000.

Daniel Burkhardtmeir Cooperage Co., 7244 South Chicago Avenue, Chicago, is receiving bids on a three-story addition to cost \$50,000.

Commonwealth Edison Co., 72 West Adams Street, Chicago, has awarded contract for a one-story substation, 50 x 92 ft., to cost \$110,000.

J. A. Sloan, 8259 Green Street, Chicago, has let contract for a one-story boiler room, 50 x 100 ft., to cost \$12,000.

Hart-Parr Co., Charles City, Iowa, machinist and founder, contemplates expanding its plant facilities.

Williams-White & Co., Moline, Ill., are erecting a foundry building, 90 x 260 ft., to cost \$100,000 with equipment.

Waukegan Foundry Co., Waukegan, Ill., contemplates construction of a plant addition.

Plans are being completed by Reiter Co., North Avenue, Elgin, Ill., manufacturer of water softeners, for two-story addition to cost more than \$40,000 with equipment. Bids will be asked on general contract soon.

Koenigsburg & Weisfeld, 155 North Clark Street, Chicago, architects, have asked bids on general contract for new six-story automobile service, repair and garage building, to cost in excess of \$250,000 with equipment.

Mathias Klein & Sons, 3200 Belmont Avenue, Chicago, manufacturers of line-men's tools and other electric power line equipment, have taken title to tract, 173 x 578 ft., on Wrightwood Avenue, and are said to be planning an additional unit.

Plans have been authorized by Ballard Storage & Transfer Co., 16 East Fourth Street, St. Paul, Minn., for four-story and basement automobile service, repair and garage building, with capacity of 300 cars, to cost \$250,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in one and three-story plant to be erected by Zinsmaster Baking Co., 97 Sherbourne Avenue, St. Paul, Minn., at Minneapolis, Minn., to cost about \$375,000, for which general contract has been let to Pike & Cook, 416 South Fifth Street, Minneapolis.

Rockford Metal Specialty Co., 624 Cedar Street, Rockford, Ill., manufacturer of automobile hardware, has superstructure under way for two-story addition, 50 x 150 ft., to cost approximately \$100,000 with equipment. Peterson & Johnson, Swedish-American Bank Building, are architects.

A. S. Alschuler, Inc., 28 East Jackson Boulevard, Chicago, architect, has asked bids on general contract for new multi-story automobile service, repair and garage building, 120 x 175 ft., to cost in excess of \$750,000 with equipment.

White Star Refining Co., Wood River, Ill., will rebuild portion of storage and distributing division at local refinery, destroyed by fire July 23, with loss reported in excess of \$150,000 with equipment.

Minnesota Power & Light Co., Power Building, Duluth, Minn., has asked bids on general contract for two-story and basement equipment storage and distributing plant, 80 x 125 ft., with shop

and repair facilities, to cost about \$150,000 with equipment. L. M. Pharis is company engineer.

Ingersoll Milling Machine Co., Douglas and Willoughby Streets, Rockford, Ill., is completing erection of three-story addition, 40 x 210 ft., to cost about \$100,000.

Terminal Grain Corporation, Grain Exchange Building, Sioux City, Iowa, has awarded general contract to Jones-Hettlesater Construction Co., Kansas City, Mo., for an addition to grain elevator to increase capacity 500,000 bu., to cost \$100,000 with equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are consulting engineers.

Reynolds Electric Co., 2650 West Congress Street, Chicago, manufacturer of fractional horsepower motors and motor-driven appliances, has taken over Korrectolite Co., maker of illuminating products.

Murray Iron Works Co., Burlington, Iowa, engineer, founder and boiler maker, has appointed following district turbine sales managers: Fred H. Dorner, 311 Knapp Street, Milwaukee; Dennis Engineering Co., 243 North High Street, Columbus, Ohio, and Briggs Weaver Machinery Co., Dallas, Tex.

Cincinnati

CINCINNATI, July 30.—Machine tool builders state that July bookings were slightly better than normal, even though sales fell somewhat short of those in June. Two large local manufacturers, whose orders the past month were double those of June, are notable exceptions to the general average. The most interesting feature of the market is that buying has been exceptionally well distributed among various industries, the usual purchases by automobile companies having failed to materialize. However, machine tool companies specializing in high production tools favored by automobile makers state that the amount of pending business in the Detroit district is of fairly good volume.

The Illinois Central is expected to place an order the coming week for rebuilding 25 motor-driven engine lathes. The Southern Pacific has bought three engine lathes and the Louisville & Nashville probably will close on several lathes in the near future. The New River State School, Montgomery, W. Va., is in the market for three lathes, one miller, one upright drill, one shaper, one grinder, one hack saw, one bench grinder and a mandril press. Purchases will be made by the school's industrial education department.

Plans are under way by Armstrong Furnace Co., London, Ohio, recently formed to take over and expand plant and business of Thomas & Armstrong Co., for new plant at Columbus, Ohio, with initial one-story unit to total about 60,000 sq. ft. of floor space. It is proposed to remove considerable equipment from London plant to new location. Entire project will cost more than \$100,000. M. B. Armstrong is president.

Andrew Jergens Co., Spring Grove Avenue, Cincinnati, has awarded general contract to Ferro Concrete Construction Co., Elm Street, for new six-story soap-manufacturing plant, 61 x 150 ft., to cost upward of \$125,000 with equipment.

Common Council, Providence, Ky., is asking bids until Aug. 13 for equipment

for municipal waterworks, including 300,000-gal. capacity steel standpipe, and 200,000-gal. capacity steel tank and tower. C. N. Harrub, Fourth & First National Bank Building, Nashville, Tenn., is engineer.

Air Corps, Material Division, Wright Field, Dayton, Ohio, is asking bids until Aug. 15 for 356 propeller blades, propeller hub lock-nuts, propeller slit hub barrel assemblies, 200 split-hub alloy propeller blades, propeller split-hub sleeve assemblies, aluminum alloy blades, propeller spinner assemblies, etc., circular 62; until Aug. 17 for 288 fuel pump assemblies, circular 60.

City Council, Memphis, Tenn., is considering a bond issue of \$1,600,000, for a municipal grain elevator, with elevating, conveying, screening and other mechanical equipment, and for extensions in railroad facilities at municipal river terminals.

Herring, Hall, Marvin Safe Co., Hamilton, Ohio, has awarded general contract to Edward Honnert Co., Mount Healthy, Ohio, for two one-story additions, 20 x 300 ft., and 20 x 100 ft., to cost more than \$40,000 with equipment.

Detroit, Toledo & Ironton Railroad Co., Detroit, is reported planning new engine house, with repair facilities, and yard extensions at Lima, Ohio, to cost in excess of \$75,000. Work is scheduled to begin in fall.

Standard Ice Co., Knoxville, Tenn., is contemplating new ice-manufacturing plant, to cost approximately \$175,000 with machinery.

Board of Education, Louisville, has secured site at Second and Bloom Streets for new boys' high school, with manual training department, to cost close to \$700,000, for which plans will be drawn by J. Meyrick Colley, Administration Building, Eighth and Chestnut Streets, architect.

Meehan Steel Products Co., Ironton, Ohio, fabricator of structural steel and steel plates and jobber of iron and steel products, has purchased plant of Ironton Punch & Shear Co. and will operate machine shop and foundry on jobbing work, furnishing replacement parts on all machines previously made by Punch & Shear company.

Brass & Aluminum Products Co., Newport, Ky., recently organized, contemplates adding a plating plant to aluminum foundry now operated by T. E. Reynolds Co.

St. Louis

ST. LOUIS, July 30.—Bids will soon be asked on general contract by General Tire & Rubber Co., Akron, Ohio, for three-story factory branch and distributing plant at Kansas City, Mo., to cost about \$200,000 with equipment. Greenbaum, Hardy & Schumacher, Scarritt Building, Kansas City, are architects.

Automatic machinery, conveying and other equipment, will be installed in new plant to be built by Eagle Bottling Works, Inc., 1912 Walnut Street, Kansas City, Mo., on site just purchased, 125 x 130 ft., to cost about \$50,000 with equipment.

St. Louis County Water Co., St. Louis, is disposing of bond issue of \$1,000,000, a portion of proceeds to be used for extensions and improvements in waterworks stations and system.

Parks Airlines, Inc., Missouri Theater Building, St. Louis, is reported having plans drawn for new aircraft manufacturing plant at East St. Louis, Ill., with

initial unit, one story, 200 x 800 ft., for parts production and assembling, to cost in excess of \$300,000 with equipment.

Southwestern Bell Telephone Co., Telephone Building, St. Louis, has revised plans for two-story addition to equipment storage and distributing plant with service, repair and garage extension for company trucks and cars, to cost about \$85,000. I. R. Timlin is company architect.

Universal Cutter Co., 4567 Scott Avenue, St. Louis, manufacturer of cloth cutting machines and parts, has awarded general contract to Woermann Construction Co., Syndicate Trust Building, for two-story and basement plant, 55 x 115 ft., to cost about \$60,000 with equipment. Alfred H. Norris, 11 Dartford Place, Clayton, Mo., is architect.

Board of Education, Maplewood, Mo., is considering installation of manual training equipment in new high school to cost about \$200,000 for which plans will be drawn by William B. Ittner, Board of Education Building, St. Louis, architect.

Gründler Patent Crusher & Pulverizer Co., 320 North Fourth Street, St. Louis, has filed plans for one-story addition, 100 x 160 ft., to be equipped primarily as machine shop, to cost close to \$50,000.

Tonkawa Petroleum Co., Tonkawa, Okla., is said to have plans for rebuilding portion of local refinery recently destroyed by fire, with equipment installation to include high pressure cracking stills and auxiliary apparatus, to cost more than \$75,000.

Arkansas Power & Light Co., Pine Bluff, Ark., plans installation of 50,000-gal. capacity steel tank on steel tower, in connection with expansion and improvements in waterworks at Risen, Ark.

Parks Air Lines, Inc., East St. Louis, Ill., plans erection of an aeroplane factory adjoining Parks airport, just south of this city.

American Steel Co., East St. Louis, Ill., will spend approximately \$250,000 in next two years on plant improvement. Work on program will commence within 90 days. A number of plant buildings will be torn down and replaced with structures adapted to making a general line of castings. Heretofore company has specialized in railroad steel castings.

Standard Steel Works, North Kansas City, Mo., manufacturer of sheet metal products, including storage and truck tanks for gas and oil, road building equipment, garage and filling station apparatus, will erect an addition, 120 x 305 ft. Company recently was given a contract by United Air Craft Corporation to manufacture aeroplanes.

Mid-West Specialty Co., Little Rock, Ark., incorporated with \$200,000 capital stock, will manufacture a gasoline reserve tank, patented by Dr. Robert H. Gillespie. Factory space has been obtained at Eighth and Izard Streets, and stamping machinery will be purchased.

Indiana

INDIANAPOLIS, July 30.—Plans are being drawn by F. Hilgemeier & Brother, 519 West Raymond Street, Indianapolis, meat packer, for new cold storage and refrigerating plant, to cost in excess of \$125,000 with equipment. T. Quatek is company engineer.

Graham-Paige Motor Co., West Warren Street, Detroit, has awarded general contract to M. J. Hoffman Construction Co., Furniture Building, Evansville, for

several one-story units, each about 90 x 240 ft., at its body-building plant at Evansville, to cost about \$500,000. This will form part of a \$1,500,000 expansion program, including addition to main plant at Detroit and extensions to body manufacturing works at Wayne, Mich.

New England Flexible Door Co., recently formed by G. E. Stevenson and G. C. Coverdale, Indianapolis, have taken option on plant of New England Pin Co., Winsted, Conn., for establishment of new factory. Structures will be remodeled and equipment installed at early date.

J. B. Bayard, 231 Main Street, Vincennes, architect, will soon take bids on general contract for new automobile service, repair and garage building, to cost close to \$100,000 with equipment.

Truck Engineering Co., East Pontiac Street, Fort Wayne, manufacturer of motor trucks, has awarded general contract to Buesching & Hagerman, 402 East Superior Street, for two one-story additions, to cost about \$35,000 with equipment. Guy Mahurin, Standard Building, is architect.

Delco-Remy Corporation, Anderson, manufacturer of automobile starting and lighting equipment, has completed plans for five-story addition, 53 x 168 ft., to cost more than \$90,000 with equipment.

Bastian-Morley Co., manufacturer of hot water heaters, Laporte, will soon build an addition to cost \$100,000.

Chicago Hardware Foundry Co., Elkhart, will soon start construction of an 80-ft. addition to its foundry to provide for a new core room.

Milwaukee

MILWAUKEE, July 30.—New business booked in July by local machine tool builders aggregates a volume considerably in excess of a year ago, and of satisfactory proportions in comparison with previous months this year. Prospects are also considered excellent for local and general revival of new shop construction. Inquiry is active, both for replacement needs and small lots for shop additions now under construction or contemplated. Sources of inquiry are broadly diversified.

Allis-Chalmers Mfg. Co., Milwaukee, which some time ago acquired entire interests of Monarch Tractor Co., Springfield, Ill., is contemplating a 100 per cent increase in production facilities of this division. It has not yet been decided if new shops are to be erected at Springfield, or entire operation transferred to main works in West Allis, Milwaukee. If this is done, a large group will be built. Monarch division builds heavy tractors, while tractor division of West Allis works specializes in lighter types for agricultural purposes.

Nash Motors Co., Kenosha, Wis., has placed general contract with Nelson & Co., Racine, Wis., for erection of a one-story addition, 63 x 238 ft., to Special Six works at Racine.

Board of Vocational Education, Green Bay, Wis., is having plans drawn by Foeller, Schober & Berners, local architects, for new \$100,000 manual training school, 120 x 150 ft., three stories and basement. Harvey Stewart is secretary of board.

Seaman Body Corporation, 1732 Richards Street, Milwaukee, division of Nash Motors Co., Kenosha, Wis., and manufacturing inclosed automobile bodies, has

acquired 20 acres near its present factories for future development. No decision has been made with respect to time of undertaking new construction. A \$250,000 addition was made early this year.

North End Foundry Co., 700 Sixtieth Avenue, West Allis, Milwaukee, is erecting a one-story shop addition, 47 x 80 ft. W. O. Krahn, 606 Fifty-first Street, Milwaukee, is general contractor.

Immel Construction Co., Fond du Lac, Wis., has general contract to erect a forge shop, 145 x 180 ft.; three-story warehouse, 96 x 125 ft., and a three-story elevator addition, 30 x 40 ft., for Van Brunt Mfg. Co., Horicon, Wis., division of Deere & Co., Moline, Ill. O. A. Eckerman, Moline, is chief construction engineer.

Strasburg Construction Co., Blackhawk Boulevard, Beloit, Wis., will erect a two-story factory, 40 x 100 ft., and a one-story shop, 50 x 100 ft., for manufacture of sash, doors and interior trim and hardwood specialties. Investment in buildings, tools and machinery will be about \$60,000.

Wisconsin Power & Light Co., 16 North Carroll Street, Madison, Wis., will build four new substations at a cost of about \$45,000. Sites have been acquired at Stoughton and Spring Green, Wis. E. J. Kallevang is chief engineer.

Magnetic Mfg. Co., Milwaukee, manufacturer of magnetic separators and special magnetic equipment, is in market for a 24-in. heavy-duty lathe.

Gulf States

BIRMINGHAM, July 30.—Plans have been approved by Wackman Welded Ware Co., Sawyer Street, Houston, Tex., for new one-story plant, to cost close to \$55,000 with equipment.

Common Council, Boerne, Tex., is asking bids until Aug. 8 for equipment for municipal waterworks, including 75,000-gal. elevated steel tank and tower. Terrell Bartlett Engineers, Inc., Calcasieu Building, San Antonio, Tex., is engineer.

Miller Refining Co., Wichita Falls, Tex., has been acquired by new interests, headed by J. J. and Meyer Taxman, who contemplate extensions and improvements in oil refinery, including installation of additional equipment.

International Paper Co., 100 East Forty-second Street, New York, has approved plans for group of units for kraft paper mill at Mobile, Ala., including main mill, 100 x 780 ft.; machine shop, 58 x 120 ft.; evaporating unit, 97 x 98 ft.; recovery room, 113 x 199 ft.; power house and other buildings. Entire project is reported to cost more than \$3,500,000. R. J. Cullen is vice-president, in charge.

Board of Commissioners, Boca Raton, Fla., will receive bids until Aug. 15 for pumping station and water treatment plant for municipal waterworks, capacity 500,000 gal. per day. Plans and specifications at office of Beulah Butler, town clerk; and H. S. R. McCurdy, 762 Lancaster Avenue, Bryn Mawr, Pa., consulting engineer.

Ponchatoula Ice Co., Ponchatoula, La., recently acquired by new interests, has plans for an addition to ice-manufacturing and cold storage plant, 100 x 200 ft., to cost more than \$65,000 with equipment. X. A. Kramer is head.

Amarillo Producers & Refiners Corporation, Amarillo, Tex., J. W. Warthar, head, is planning construction of new oil

refinery in vicinity of Pyote, Tex., with initial capacity of about 3000 bbl. per day, to cost close to \$200,000 with equipment.

State Building Commission, Jackson, Miss., is planning a steam-operated electric power plant at Oxford, Miss., to cost close to \$40,000 with equipment. Frank P. Gates, Edwards Hotel, Jackson, is architect.

Palmer Electric Sign Co., 20 East Forsyth Street, Jacksonville, Fla., is planning installation of equipment in local building, including metal-working machinery, shears, etc.

City Council, Jacksonville, Fla., is having plans drawn for an automobile service, repair shop and garage for municipal trucks and cars, to cost more than \$70,000 with equipment. City engineering department is in charge.

Phelps & DeWees, Gunter Building, San Antonio, Tex., architects, have plans for three-story automobile service, repair and garage building, 110 x 125 ft., to cost close to \$150,000 with equipment.

Tuscaloosa Ice & Cold Storage Co., Tuscaloosa, Ala., will make extensions and improvements in ice-manufacturing and cold storage plant, including installation of additional equipment, to cost about \$50,000.

Town Council, Kaplan, La., will receive bids until Aug. 14, for equipment for municipal electric light and water plant, including Diesel oil engine with capacity from 150 to 200 b.h.p. direct-connected to electric alternator, 2300-volt, 60-cycle, 3-phase, with belted exciter and direct-driven exciter; one 500-gal. per min. direct-driven pumping unit, with starter and accessories. C. H. Brookshire is town clerk.

Texas Pipe Line Co., Houston, Tex., has awarded contract to Saigh Engineering Co., Houston, for installation of 8-in. welded pipe line from Corsicana to San Augustine, for oil service, connecting with line from Port Arthur to San Augustine. Work will include installation of booster stations and other mechanical equipment.

Gulf States Paper Corporation, Tuscaloosa, Ala., has let contract to United Engineering & Construction Co., Philadelphia, for steam power plant to cost approximately \$600,000.

Prest-O-Lite Co., Birmingham, has let contract to Smallman Construction Co., Birmingham, for new plant to cost about \$50,000.

Pacific Coast

SAN FRANCISCO, July 25.—Lok-S-Top Fixture Co., Los Angeles, has leased one-story factory, 85 x 150 ft., to be erected on McKinley Avenue, and will equip for manufacture of metal specialties, to cost more than \$25,000. General building contract has been let to Ted R. Cooper, Inc., Western Pacific Building.

Electric Steel Mfg. Co., 3334 East Slau-son Avenue, Vernon, Los Angeles, has taken out permit for one-story addition.

Kenneth Macdonald, Jr., Spring Arcade Building, Los Angeles, architect, has plans for twelve-story automobile service, repair and garage building, 75 x 156 ft., to cost in excess of \$450,000 with equipment.

Municipal Light Department, County-City Building, Seattle, has engaged Joseph Wilson and Paul Richardson, Henry Building, architects, to prepare plans for two-story and basement power substation, with equipment storage and repair facilities on upper floor, to cost upward of \$450,000 with machinery.

Oregon Canning Co., Lebanon, Ore., is considering rebuilding of portion of plant destroyed by fire July 24, with loss close to \$300,000 including equipment.

F. A. B. Mfg. Co., Oakland, Cal., manufacturer of pumps, parts, etc., is having plans drawn for one-story addition to plant at Emeryville, to cost about \$24,000 with equipment. McWethy & Greenleaf, 2710 Telegraph Avenue, Oakland, are architects.

Board of Education, Escalon, Cal., has approved plans for a one-story manual arts building at local high school, to cost close to \$30,000 with equipment.

Board of Education, Los Angeles, has authorized plans for one-story manual arts shop addition at James A. Garfield High School, to cost more than \$40,000 with equipment. Architectural division is in charge.

Hill-Mills Co., Spokane, Wash., representative for Cleveland Tractor Co., has plans for one-story plant, 50 x 150 ft., to cost about \$25,000 with equipment; unit will be used for parts, repairs and other service. Wells & Bertelson, Hyde Building, are architects.

Biles-Coleman Lumber Co., Omak, Wash., has authorized plans for a one-story addition to mill to cost approximately \$200,000 with machinery.

Canada

TORONTO, July 30.—Sales for the week, while confined mostly to single tools, covered many lines of industry and were in sufficient volume to maintain the former high weekly average. While current demand is mostly for replacement, orders for two or three units are appearing for garages and automobile repair plants. Inquiries are also being received for tools and equipment for new industrial plants, and it is expected that by the first of September builders and dealers will be well supplied with orders on new works account.

Ratepayers of Oakville, Ont., have carried by-laws in favor of establishing two new industries there, namely General Metal Devices, Ltd., and General Tire & Rubber Co. Manufacturing plants will be erected immediately.

John Evans, Water Street, Galt, Ont., is preparing plans for a one-story addition to plant of Dominion Tack & Nail Co.

C. Huet, 5039 Sherbrooke Street West, Montreal, is having plans prepared for erection of a five-story cement plant, concrete and brick construction, and is interested in prices and machinery.

Fittings, Ltd., 135 Spruce Street, Oshawa, Ont., manufacturer of chain belting, etc., will build an addition to cost \$40,000.

Shawinigan Chemical Co., Shawinigan Falls, Que., contemplates following construction in connection with its plant: Transformer building, lime kiln building to cost \$270,000, addition to grinding plant to cost \$55,700, new water line on Transmission Avenue to cost \$60,000, cooling room to cost \$50,000.

C. Lloyd & Son, Wingham, Ont., will build an addition to their wood-working plant and will require machinery and other equipment.

National Standard Co., Guelph, Ont., has awarded contracts in connection with \$12,000 plant addition for manufacture of wire braid, etc.

I. T. S. Rubber Co., of Canada, Ltd., 30 Alpine Avenue, Toronto, Ont., has awarded contracts for an addition to its plant, to cost \$80,000.

Phillips Plate Glass Co., Ottawa, Ont., contemplates erection of a manufacturing plant at Regina, Sask.

Western Canada

M. Peterson, City Clerk, Winnipeg, Man., will receive bids until Aug. 13 for two main hydraulic turbines and two service turbines to be installed at Slave Falls; plans with Hydro Electric System, 85 Princess Street, Winnipeg.

Foreign

IN connection with hydroelectric power project on Dnieper River, Russia, for Soviet Russian Government, now in progress, and estimated to cost \$85,000,000 with transmission system, purchases of additional equipment will be made under direction of Col. Hugh L. Cooper,

101 Park Avenue, New York, consulting engineer. During past year machinery in amount of \$1,500,000 has been purchased, and future expenditures for final completion are estimated in excess of \$15,000,000. Amtorg Trading Corporation, 165 Broadway, New York, is official buying agency for Soviet Government.

Department of War, The Hague, Netherlands, has authorized appropriations totaling close to \$100,000 for purchase of aeronautic equipment for Netherlands, East Indies, during 1929.

Power Securities Corporation, Ltd., London, England, has secured a concession for furnishing electric light and power and water in Palestine district, vicinity of Jerusalem. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference Palestine No. 281817.

Fabrique Nationale D'Armes De Guerre, Herstal, Liege, Belgium, plan to install a battery of steam or compressed air stamping hammers, of various powers, as follows: 8000, 6000, 3500, 1750, 1000 and 750 lb. Particulars on use, and respective advantages and disadvantages of the two fluids are desired, considering the alternate systems in their entirety from the boiler or compressor, as the case may be.

Aeroindustry Stratus, Stockholm, Sweden, recently organized to manufacture aircraft and parts, has acquired a factory at Kungsor, near Eskilstuna, and plans early establishment of new plant for parts production and assembling, as well as aircraft motors ranging from 80 to 450-hp. rating. Company has requested loan of National Swedish Government in amount of 160,000 crowns (about \$41,000) to provide for initial operations.

Machinery Exports Ahead of Last Year

Six-Month Total Exceeds 1927 by 13 Per Cent—Imports Running Behind the First Half a Year Ago

WASHINGTON, July 27.—Exports of machinery aggregated a value of \$43,098,072 in June, against \$44,670,652 in May. For the six months ended June 30 they were valued at \$239,760,570, against \$212,116,959 for the corresponding period of last year. In June, 1927, exports of machinery were valued at \$34,192,252. Exports of industrial machinery in June were valued at \$20,031,155—slightly under May, when the value was \$20,274,976. For the first six months, exports of industrial machinery were valued at \$109,213,866, as compared with \$100,121,242 for the first six months of

1927. For June of last year exports of industrial machinery were valued at \$15,834,223.

Exports of power-driven metal-working machinery in June were valued at \$2,358,324, against \$1,970,348 in May. For the first six months exports of this class of equipment were valued at \$12,146,706, against \$8,728,733 for the corresponding period of last year. In June of last year exports of power-driven metal-working machinery were valued at \$1,496,908.

Exports of power-driven metal-working machinery as listed in THE IRON AGE table totaled 871 units, val-

ued at \$1,479,944, in June, compared with 724 units, \$1,235,109 in May.

Total imports of machinery and vehicles in June were valued at \$2,532,494, against \$2,424,688 in May, and \$2,293,115 in June of last year. For the first six months the values were \$13,934,429 in 1928 and \$15,331,523 in 1927. Imports of industrial, office and printing machinery in June were valued at \$1,745,826, against \$1,457,391 in May, and \$1,370,498 in June of last year. For the first six months they were valued at \$8,430,630, against \$9,058,831 for the first half of 1927.

Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	June		Six Months Ended June 30	
	1928	1927	1928	1927
Locomotives	\$142	\$343	\$1,025	\$3,941
Other steam engines.....	97	63	549	774
Boilers	129	155	582	984
Accessories and parts.....	34	49	335	260
Automobile engines	1,117	1,023	7,993	7,136
Other internal combustion engines	1,071	558	4,311	3,525
Accessories and parts.....	378	322	1,950	1,992
Electric locomotives	85	67	1,034	531
Other electric machinery and apparatus	626	523	3,801	4,136
Excavating machinery	241	319	1,435	2,204
Concrete mixers	66	64	511	634
Road making machinery.....	313	288	1,502	1,216
Elevators and elevator mach'y	372	434	2,147	2,470
Mining and quarrying mach'y	1,358	920	6,913	6,974
Oil well machinery.....	1,174	1,154	6,809	9,952
Pumps	499	379	2,778	3,051
Bending and power presses... ..	283	101	917	770
Forging machines	97	114	407	476
Machine tools*	1,478	916	7,372	5,466
Other metal-working machinery and parts.....	512	411	2,970	2,320
Textile machinery	1,165	1,896	6,830	11,516
Sewing machines	771	393	4,472	2,590
Shoe machinery	173	154	947	768
Flour-mill and gristmill machinery	25	39	231	234
Sugar-mill machinery	280	217	2,160	1,329
Paper and pulp mill machinery	199	248	1,704	2,243
Sawmill machinery	73	78	458	389
Other woodworking machinery	152	102	916	668
Refrigerating and ice-making machinery	819	753	3,935	3,680
Air compressors	770	512	3,474	2,976
Typewriters	1,885	1,701	11,682	10,680
Power laundry machinery.....	103	113	585	772
Typesetting machines	375	284	2,268	1,915
Printing presses	410	543	3,051	3,023
Agricultural machinery and implements	10,295	7,857	54,012	42,248
All other machinery and parts.....	15,528	11,099	87,694	68,274
Total	\$43,098	\$34,192	\$239,760	\$212,117

*Principal details in another table.

Imports of Machinery into the United States

(By Value)

	June		Six Months Ended June	
	1928	1927	1928	1927
Metal-working machine tools.....	\$47,447	\$36,633	\$316,938	\$280,889
Agricultural machinery and implements	333,455	439,087	2,913,216	3,563,315
Electrical machinery and apparatus	97,611	165,944	737,540	948,721
Other power-generating machinery.....	12,276	5,154	84,828	43,832
Other industrial machinery	1,163,176	608,651	4,810,835	4,774,677
Vehicles except agricultural	250,732	187,503	1,427,616	1,157,537
Total	\$1,904,697	\$1,442,972	\$10,290,973	\$10,768,971

Exports of Power-Driven Metal-Working Machinery

	June, 1928		May, 1928	
	No.	Value	No.	Value
Engine lathes	85	\$195,814	63	\$126,294
Turret lathes	43	92,788	60	110,497
Other lathes	42	139,257	41	140,333
Vertical boring mills and chucking machines	6	7,427	17	42,563
Thread-cutting and automatic screw machines	91	123,397	63	80,635
Knee and column type milling machines	47	116,260	22	49,293
Other milling machines.....	115	133,227	34	88,974
Gear-cutting machines	38	110,014	43	101,770
Vertical drilling machines.....	52	49,641	23	13,112
Radial drilling machines.....	15	41,837	10	21,913
Other drilling machines.....	89	81,876	72	26,231
Planers and shapers.....	44	76,082	24	63,348
External cylindrical grinding machines	88	218,415	77	202,345
Internal grinding machines...	56	57,672	95	90,068
Metal-working tool-sharpening machines	60	36,237	80	77,733
Total	871	\$1,479,944	724	\$1,235,109